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Student Chapter American Society of Civil Engineers

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River Bank Stabilization Using Hybrid Revetments

by Wes Nickerman, ERE Senior

For the past year I've had the opportunity to work as a student assistant for ERE Professor Margaret Lang on a project to assess the performance of hybrid revetments for river bank stabilization. Hybrid revetments utilize vegetation for stabilizing river banks, in contrast to traditional rock slope protection (RSP) methods that require placing large rocks on the slope. Hybrid revetments are intended to mimic natural systems and provide habitat, and they are increasingly being installed to meet permitting requirements. The project is funded by Caltrans, and is intended to improve their design methods. Our task is to monitor hybrid revetments with different design characteristics that have been installed throughout the state, and evaluate their performance. This project is a three-year effort that will result in a final technical report to Caltrans that summarizes the results of our field data and includes recommendations to improve revetment designs.

Wes using a total station to shoot a cross section of Rush Creek near Weaverville, California.

The study includes field sites located throughout California, including one each on the North Fork Mattole and Mad River, two near Weaverville, and others near Santa Barbara. The sites were chosen to compare different methods of building hybrid revetments that incorporate both rock and plant materials. We are primarily comparing which plants were used (typically willow and alders), how the plants were placed, and the stability of the revetments.

I first saw the posting for this position on a flyer in the Fish Bowl in Science D. It immediately caught my eye, since I had experience in river hydraulics/safety, GIS, and AutoCAD (three requirements for the job). I was also interested in working with Professor Lang because I had taken her Fluid Mechanics class two semesters prior, and it was one of the best classes I have ever had. She has been a great supervisor, creating

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FROM THE EDITORS

Hello from the Messenger staff! We hope you enjoy this Fall 2012 edition.

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"There are no facts, only interpretations."

Friedrich Nietzsche

(1844-1900)

Alumni Profiles

Mike Kowalski
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I think fate led me to the ERE program at HSU. After graduating from high school in my hometown of Cincinnati, Ohio, I spent a year at Ohio State University. There I decided that I wanted to attend a university somewhere on the West Coast where I could learn to surf and study something interesting and challenging. The ERE program caught my attention because of the classes on appropriate technology and alternative energy, and also because of the implicit challenge of an engineering curriculum.

The program proved to be what I had hoped. The variety of subjects kept me highly engaged throughout my course of study. Aside from the basic skill sets that I acquired in specific disciplines ranging from computer programming to water quality to building energy efficiency, in the end I felt confident that I was generally more capable of taking on and resolving problems that require critical thinking and analysis, regardless of the subject matter.

Shortly after graduating in the winter of 2006, I joined the staff of the Redwood Coast Energy Authority (RCEA) in Eureka, California. RCEA is a Joint Powers Authority whose members include the County of Humboldt; the Cities of Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Dell, and Trinidad; and the Humboldt Bay Municipal Water District. Its purpose is to develop and implement sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient and renewable resources available in the region.

I feel lucky to have found a job locally in the field of energy. My day-to-day duties at RCEA involve managing energy efficiency upgrade projects in non-residential buildings within Humboldt County. I am in charge of specifying the scope of work for the projects, handling the sales aspect of getting the projects approved, managing installation contractors, and performing quality control checks throughout the process. These activities take place under a program called Redwood Coast Energy Watch (RCEW), which is a local government partnership program between Pacific Gas and Electric (PG&E) and RCEA. However, since RCEA has a relatively small staff and a relatively wide sphere of influence, everyone on staff here can find themselves helping with a diverse set of tasks that make up the general operations of RCEA. On some days I might be helping a team of interns install CFLs (compact fluorescent lamps or light bulbs) in a senior living facility, while on others I might be negotiating aspects of our RCEW contract with PG&E.

I have also carved out a small amount of time to work with a family-owned public transportation consulting firm called Urban Transportation Associates (UTA) that is based in Cincinnati, Ohio. At UTA, I develop software that aggregates and analyzes data that is collected from different public transit agencies throughout the world. These analyses provide planners at public transit agencies with insights about their systems that helps them to plan and operate their systems efficiently.

I earned my EIT certification in 2006, but have not yet gained sufficient work experience to sit for the PE exam. However, I'm not in a big hurry. I plan to have it by age 40, and in the meantime, I can catch a few more waves during my lunch breaks.

Alumni Profiles

Sheryl Carrubba, P.E.

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In 1980 I graduated from HSU with a BS in Environmental Resources Engineering. While waiting a few months for a job offer to come through, I performed contract work for Humboldt County, working on a solid waste management plan. The first plan was developed almost directly from the textbook examples found in the ERE curriculum.

In December 1980, I moved to Anchorage, Alaska, where I worked as a Design Engineer for the Alaska Area Native Health Service (ANS), a section of the U.S. Public Health Service. I developed designs and specifications for water supply, sewage treatment and solid waste management systems for housing projects in Alaskan native villages. I also studied for and passed the registration exam in civil engineering. All of my work at the ANS was directly related to the water resources and water quality coursework at Humboldt State.

After about 4 years, I was promoted and transferred to the Alaska Regional Office of the Department of Housing and Urban Development (HUD), where I served as the General Engineer for the office. For this job I traveled extensively around the state of Alaska to visit village housing projects, many of which were also served by its sister program in the ANS. This job greatly expanded my knowledge of construction, heat and mass transfer, and public service.

In 1986 I was married, and when my husband's company transferred him to Vancouver, Washington, we moved to nearby Portland, Oregon. I initially transferred to the local HUD office, but shortly after arriving secured a job with the Portland District Army Corps of Engineers in Waterways Maintenance. I started learning the dredging business, which is very much an application of pumps, soil mechanics, and open channel and pipe flow. In addition, the environmental assessment and water quality courses I took at HSU helped me to understand and avoid environmental impacts, and to assess sediment contamination pathways. All that organic chemistry had a real-world application!

I have remained in navigation-related jobs at the Corps of Engineers, where I have been a project manager, contracts chief, dredging operations deputy chief, and program chief, and in 2004 I took the job leading the district's navigation program as Operations Project Manager for Channels and Harbors. The blend of environmental knowledge, conservation sensitivity and engineering I gained at Humboldt was the perfect launch pad for my career.

The Portland District is responsible for the Corps' water resource activities in western Oregon and southwestern Washington. In my position, I serve as the District's key advisor to the Corps' District Commander on issues involving maintenance of 22 active navigation projects, including about 175 miles of waterways, 11 coastal entrances and the barge channel between Vancouver, Washington, and McNary Dam. I am also responsible for the operations and maintenance of the District's two hopper dredges, the Essayons and the Yaquina, which are berthed and maintained at the U.S. Moorings Facilities in Portland, but which travel all along the west coast, Alaska and Hawaii. In carrying out these responsibilities, I oversee nearly 160 personnel that include licensed and unlicensed ships personnel, technicians, hydrographic and land surveyors, engineers and administrative staff who help accomplish these Channels and Harbors missions. Regional and international waterborne commerce depends on maintenance of the channels and safe passage over the breaking entrance bars in the Pacific Northwest.

Nathan Lohse

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I first heard of Humboldt in 1996 when I was looking into colleges as a sophomore in high school. After attending a week-long hydrology camp the previous summer, I had set my mind to a career path in Forestry or Hydrology. However, when I graduated from high school I wasn't prepared for college, so I joined the U.S. Coast Guard in the hopes of gaining valuable life experience. I spent six months in Alaska and the remaining four years in Florida. By the time I left the Coast Guard I was a completely different person, and felt that I was prepared to enter adulthood and pursue my educational goals. I returned to California and started taking engineering courses at Sierra Community College, and I eventually investigated engineering schools and was impressed with the ERE program at HSU.

When I began my student career at Humboldt I figured I was going to go into water quality or waste water engineering. However, ENGR 115 opened my eyes to the renewable energy option and my path was set.

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Capstone Demystified

by Jessica Bruce (ERE 2012)

ENGR 492 "Capstone Design Project," or just "Capstone," is the culminating senior design course in the ERE major, and all students are required to take it within 16 units of graduating. It provides senior ERE students with the opportunity to work on a project with a real client, and students learn how to contact a client when issues arise. Unless you have been through the course, it is impossible to fully appreciate the time commitment and responsibility that are required.

The student-teacher relationship is different in Capstone than in other courses. Teachers act primarily as guides and facilitators to ensure that groups stay on the appropriate timeline. Most senior design courses have regular homework assignments and tests throughout the semester, but this is not the case with Capstone. There are no exams, and the main deliverable for the class is the project report. There are several intermediate versions of the report due throughout the semester, which allows students to receive feedback from the teachers and clients.

I took Capstone in my final semester, along with Electronics, Environmental Impact, and River Hydraulics. I was also the treasurer for the Society of Women Engineers. My semester was challenging because I had three group projects. I signed up for this load reluctantly, but I didn't want to push graduation back another semester. I can say without a doubt that my social life was nonexistent! But, taking three engineering courses along with Capstone is not for everyone. I recommend saving at least one GE course for your last semester, and don't take too many classes at the same time that have group projects. You may think that group projects should be easier than individual projects, but that is not necessarily true; finding time to meet with three other people to discuss one project can be a nightmare! Not to mention that each person might interpret things differently, which can slow project momentum considerably. Even though this class may seem daunting, the issues of time management and teamwork are present in the real workplace, and one intent of Capstone is to teach you how to handle these issues professionally.

The spring 2012 Capstone class projects were focused primarily on renewable energy, which is one of the main topics that attracted me to engineering. The projects included designing (1) an electric vehicle charging station for the HSU campus, (2) an electric vehicle charging infrastructure for Humboldt County, (3) a system for generating biodiesel at Blue Lake Casino, and (4) a process for producing torrefied biomass pellets to replace coal. My team included Zak Stanko, Derek Hancey, and Andy Harris, and our project was the design of an agent-based model for installing electric vehicle charging stations throughout Humboldt County. We titled our report "Charging the Future: An Electric Vehicle Infrastructure Design for Humboldt County."

Our project was complex because we had to learn two programming languages as well as the basics of electric vehicle operation. We all thought this was a very exciting project, but none of us knew anything about electric vehicles or agent-based modeling. With no prior experience in NetLogo or R scripting, we had a steep learning curve early in the semester. Fortunately, our client was Colin Sheppard (MS ERE 2009) from the Schatz Energy Research Center, and he helped us learn both of the programs. He also introduced us to an accomplished NetLogo programmer, Steve Railsback, who helped us to narrow our program down to something that could be developed in 16 weeks. On top of that,

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ERE students (left to right) Jessica Bruce, Andy Harris, Derek Hancey, and Zak Stanko after presenting their ERE Capstone Design Project during a poster session in May 2012.

Appropriate Technology in the Dominican Republic

by Taylor Edwards, ERE Senior

Since 2005, ERE Instructor Lonny Grafman has been taking HSU students to far-away places. He has created a 6-week-long summer program called Practivistas Dominicana (previously known as HSU Dominicana) in which HSU students travel to a foreign country, immerse themselves in Spanish language and culture, live with local families, learn with local resident university students, and gain hands-on experience in appropriate technology and sustainability.

The program began in Parras, Mexico, but due to social unrest in Mexico, has found a new home in the Dominican Republic (DR). In the summer of 2012, sixteen HSU students, including eight ERE majors, traveled with Lonny to DR. These "Practivistas," as program participants are known, spent six weeks working on a renewable energy project, rainwater catchment systems, and alternate building techniques. I participated as a student in 2011, and as Lonny's Teacher's Assistant in 2012.

When I went to DR for the first time in 2011, I had very little idea of what the country would be like. As I traveled in and around the capital city of Santo Domingo, I saw donkey-driven carriages going down the freeway, motorcycles transporting washing machines, and kids diving into the blue Caribbean Sea, and I heard Bachata blasting from stereos. It was immediately apparent that this program would be a real adventure.

We each received 10 semester units of academic credit for participating, earning 4 units in Spanish, 3 in Engineering, and 3 in General Education. Dominican students worked with us as well. The class experienced a great deal of learning throughout the program period. In addition to taking classes and working on group projects, we learned how to live in a new country. Dealing with new ways of transportation, communication, and new diets was a learning experience each and every day. Communicating effectively and managing time with our Dominican classmates was also a learning process.

Ecoladrillo schoolroom for 25 students, designed and built by Practivistas Dominicana participants.
Photo by Eddy Trinidad

Living with a host family was a new experience for me as well. I lived in a home with seven other people, none of whom spoke English. I knew a small amount of Spanish when I arrived, but living with a Spanish-speaking family forced me to improve my skills quickly. I loved my family's cooking and I was surprised that none of it was spicy. One of the staple dishes is "mangu," mashed plantain with fried onions and eggs. My family grew guava, banana, pineapple, and mango in the back yard, and it seemed like I was constantly eating fruit.

The American and Dominican students were organized into three teams, each with its own project located in the neighborhood of La Yuca. I was a member of the renewable energy project team, which included two Dominican students and three HSU students. Together, we constructed a vertical axis wind turbine using a DC motor and parts from a bicycle and a newspaper press. We also mounted a small solar panel to the top of the turbine's frame. The turbine and solar panel are used to light a schoolroom that was built by the alternative building team. The schoolroom was constructed using a method called "Ecoladrillo," where plastic bottles are used as infill. The school was in danger of being shut down, but the addition of the schoolroom helped to keep the school open by providing additional teaching space. The third team designed and installed a rainwater catchment system for the roof of the schoolroom. Being a student in the program involved a lot of hard work. The program was similar to ENGR 215, except it was more intense and rewarding. Throughout the

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ERESA Annual Rafting Trip

Never let the truth get in the way of a good story!

by Lianna Winkler-Prins, ERE Junior

"All right, everybody… forward paddle, please. And, stop. Left turn! Left turn!"

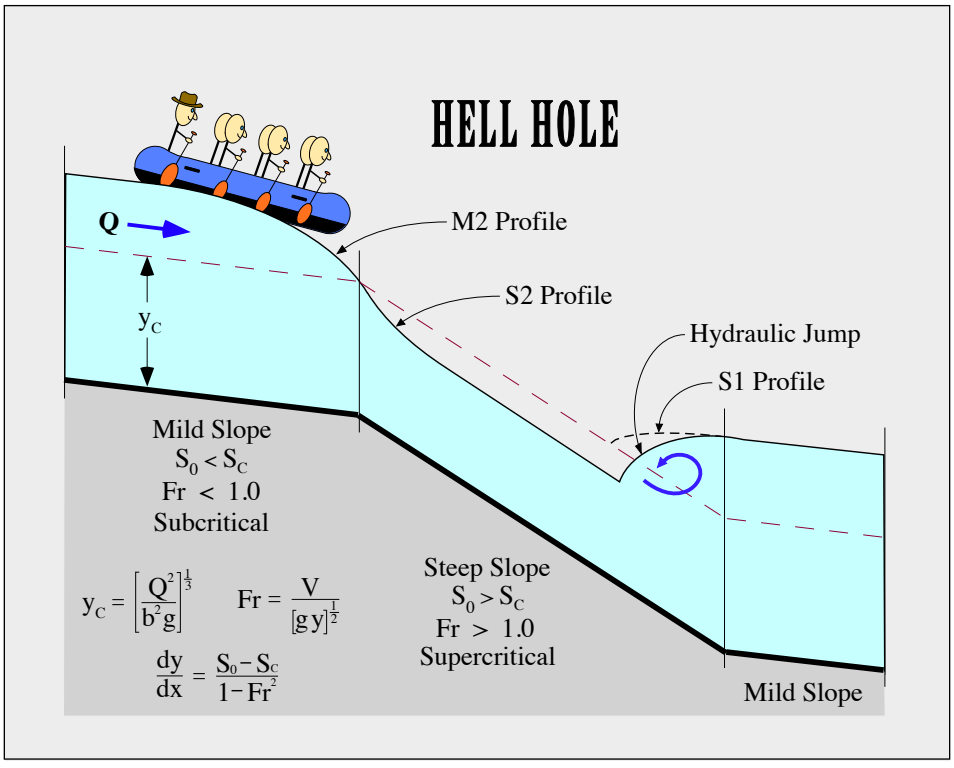
A familiar voice is shouting commands from behind you – commands that you are desperately trying to follow as the raft you are in pummels downriver through boiling whitewater, and maneuvers around a boulder. However, prior to this day, the voice is one you had associated with classrooms, chalk boards and lectures on engineering mechanics. And, the people clinging to the boat are usually sitting at the desks next to you in school. You are on the Environmental Resources Engineering Student Association (ERESA) rafting trip, your river guide is your Dynamics professor, Mike Anderson, your crew members are your classmates, and you are having the time of your life.

The ERESA Rafting Trip came into being in the summer of 1991 with the crossing of paths of ERE Professor (now Emeritus) Mike Anderson and a potential ERE student (now grad) named Patrick Sullivan. Patrick had traveled the world as a commercial whitewater rafting guide for seven years, but was looking to add a new dimension (engineering) to his life. After visiting Mike in his office to learn more about HSU and the ERE program, Patrick enrolled the following fall. And, when Mike asked Patrick if he would like to help organize an ERESA rafting trip, Patrick enthusiastically agreed.

The first trip in the fall of 1991 on the Klamath and Cal Salmon Rivers was a huge success. Mike enjoyed himself so much that he went to guide school the following spring break, and for the seven summers 1993-99 guided professionally for Whitewater Voyages on the Kern River. He began guiding the ERE trips with Patrick in 1994. Since then, Mike has purchased two commercial rafts and the associated paddles, life jackets, and gear that has safely carried hundreds of ERE students, faculty, and friends down the rapids of Northern California. Patrick, who graduated from the ERE program in 1996, continues to lead the trips, and often contributes a third raft to accommodate the many students who want to get out on the river.

April 2012 marked the 22nd annual trip. Over the years, four different runs on four rivers have been rafted, led by many different guides. The Class IV "Ikes" section of the Klamath River and "Butler Creek Run" on the Cal Salmon were the destinations during the early years, and two trips have also been made down the Class IV South Fork of the Smith River. While these runs are beautiful and exciting, they are also technically and logistically challenging. More recently, the trip has been on the Class III to III+ "Pigeon Point Run" on the Trinity River. This run is exciting for beginning and experienced boaters alike, and making two Saturday runs and one Sunday run is logistically simpler. For the past several years, the core guides have been Patrick, Mike and Tony Llanos (ERE 1996).

Paddle boats, as opposed to oar boats, are nearly always used on the ERE trips. In a paddle boat, all of the people in the raft are responsible for paddling and following the commands of the guide ("Forward!," "Left turn!," "Right turn!," "Stop!," etc.). In an oar boat, the guide rows, and participants usually just hold on. Paddle boats



Guide and crew about to drop into the idealized Hell Hole.
Illustration by Lianna Winkler-Prins and Mike Anderson.

require that all rafters participate in getting the raft safely down the river, and are generally more fun. Teamwork is a must in a paddle boat, and some rafting companies advertise their trips as a fun and effective method of team-building.

The number of students, faculty and friends going on the trips has ranged from 20 to 60, using two to four rafts. Often, participants are able to go on more than one run, provided space is available in the boats. Depending on the location and logistics, either one or two runs are made on Saturday, and one run is made on Sunday. Students are allowed to bring one guest, and all participants pitch into the effort by volunteering for a committee (rafting gear set-up and take-down; food buying, prepping and cooking; carpooling; and camp clean-up). The group camps together Saturday night and enjoys communal Saturday dinner and Sunday breakfast. ERE faculty and staff are invited as well, and over the years Bob Gearhart, Beth Eschenbach, Margaret Lang, Eileen Cashman, Colin Wingfield, Lonny Grafman, and David Vernon have each paddled on at least one trip.

As with many thrilling pastime activities, rafting has the elements of surprise and uncertainty. The question of whether or not anybody will "swim" during a run, and who it will be, certainly adds to the fun factor. Over the years, there have been trips where not a single person flew (unintentionally) into the water, while on other trips, one or more boats flipped and the entire crew went for a swim, guide included! Regarding unplanned swims, Mike quotes generations of boaters when he says, "There are them that has, and them that will." However, to minimize the dangers associated with rafting, all paddlers circle up for a safety talk before the run begins.

Taking dozens of people out on the river is bound to generate some hilarious and memorable circumstances. Having completed trip number 22 this past Spring, Mike is full of stories, and his eyes light up if you ask him to share one. Here is just one of the many:

"In the spring of 1999, sophomore ERE students Katie and Joanne came to see me many times to ask about the trip, trying to decide if they wanted to go, going back and forth, first "yes," then "no." They seemed excited about the prospect, but I could tell that Joanne was also pretty apprehensive. A week or so before the trip, she came in alone to talk to me, and she confided that she couldn't swim and was very nervous about going. I told her that our goal is always to have a fun, safe trip, and I described some of our safety precautions. I also reminded her that she would be wearing a life jacket, and that we guides would be keeping an eye on her and all the other paddlers. I also gave her the names of some students from previous trips who I thought had been a bit nervous at the start, and she talked to some of them. In the end, she and Katie did go on the trip. I didn't get a chance to talk to her at the end of the trip while we were packing up, but I did see her big smile several times during the trip. After summer break she came into my office to thank ERESA and the guides for the trip, and to tell me that she had had such a great time rafting that it had inspired her to take swimming lessons over the summer!" **END**

"...I saw an eagle flying around with a snake in its talons. And the chit chat on the water with professionals and students was awesome!" – Anonymous ERE Student

"Rafting was a great experience; it was my first time and not my last! It was a feeling that I can't describe. If you've never rafted, it is time to go!" – Andres Benitez, ERE Senior

Guide Extraordinaire Patrick Sullivan and crew about to drop into Hell Hole.
Photo by Leslie Scopes Anderson.

REU in Bioengineering at UC Santa Barbara:

My Summer in the Dream Life

by Kayla Williams, ERE Senior

What are you doing next summer? If you think it is too early to ask yourself this question, you could miss out on some exciting opportunities that can provide you with unparalleled professional development, work experience, network expansion, and lifelong friendships. Research Experience for Undergraduates (REU) programs offer summer internships within academia where you conduct research with a mentor (usually a professor, post-doc or graduate student) on an existing project within a certain field. REUs are offered by universities across the country, and most programs support intern cohorts, meaning you get to know talented students with diverse backgrounds from all over. REUs differ from internships in government and industry primarily because you are conducting research instead of gaining direct work experience.

An REU is a great experience for a student who is considering graduate school, especially one who has not already conducted research. In addition to research experience, the professor you work under will most likely be willing to write a recommendation for you when you leave, which is a valuable addition to any graduate school application. In addition, you will develop greater awareness of existing projects within your field of study, begin to formulate ideas of what you would like focus on in graduate school, and learn what the life of a graduate student is like. All of these are valuable when you submit your graduate school application, whether for selecting the school based on research you're interested in, or writing an essay on your intended area of focus.

When I started college I didn't seriously think I might go on for an advanced degree. My parents didn't go to graduate school, and as engineering majors with hirable bachelor degrees, few of my peers have pursued additional schooling. The thought didn't even cross my mind until I spent three summers interning in industry. The first summer I worked for Anchor QEA, a private engineering consulting firm, and the next two I worked for Boeing, a leader in aerospace. These experiences were invaluable for showing me what I didn't want to do, especially with regard to work environment, hours, and activities. I'm not certain of all the reasons, but I know that taking a permanent job with either of these companies would mean settling for a job I wasn't going to love.

A friend of mine attended an REU the last summer I worked for Boeing, and his positive experience got me thinking about REUs and graduate school. I had no experience conducting research, and I decided that I wasn't going to apply to grad school without knowing what I was getting myself into. In addition, I learned from my previous internships that environmental engineering wasn't my passion, and I decided that I would pursue an interest in bioengineering that I had developed over the past couple of year. With these two realizations, I began researching bioengineering REU programs. I recommend starting this process during winter break since many deadlines are in early February. I found REUs primarily through the database on the NSF (National Science Foundation) website (http://www.nsf.gov/crssprgm/reu/reu_search.cfm), but I also Googled 'bioengineering REU.' I ended up applying to ten different REUs, most in bioengineering, but some in renewable energy, my other

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REU RISE Participants Summer 2012
University of California, Santa Barbara

Capstone

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the model was not the only deliverable for the class, as we also had to write a complete project document.

The biggest source of conflict in our group was probably deciding when to stop working on the model and start working on the document. Having a project that depended heavily on a working model made it difficult to meet the intermediate deadlines on a timely basis. To complete the sections in the report, the model needed to produce accurate results, and this provided us with the opportunity to camp in Science D Room 13 on a regular basis!

When you take Capstone, you need to get along with your group members, because they will become your new closest friends for the semester. In a normal week our group met Mondays at 6pm, Tuesdays at 5pm, Thursdays at 9am and Fridays at 4pm, so I spent anywhere from 15 to 25 hrs/week on the project, which is practically a part-time job! In a typical 3-unit class you are expected to spend about 9 hours outside of class working on assignments, but Capstone is not a typical course. It provides you with your culminating senior design experience, and teaches you how to work in teams, learn time management, and act as a true consulting engineer.

I currently work for a consulting engineering firm that requires me to work in a team environment under specific timelines. I had to learn new concepts and computer software, such as wastewater treatment systems and AutoCAD, that I had not learned while at HSU. The experiences I had in Capstone and other ERE courses helped me learn how to research topics that I have no knowledge base in, so that I could complete tasks. Capstone is a great course for exploring real, complex problems at a much deeper level than in any other senior design course. I highly recommend that you think about the time commitments of the class and pick a project you are interested in, because it will help keep you and your group motivated. Yes, Capstone is very challenging. However, when you reach the end of your project, you and your group will truly be experts on the topic, and you will be very proud of what you have accomplished! **END**

Dominican Republic

Continued from page 5

program, I developed as a problem solver. The program made me excited to be an engineering student. Long before I returned home, I knew that I wanted to continue my involvement with the program.

My second trip to DR was very different from my first. As Lonny's Teacher's Assistant I was somewhat on my own schedule. I spent most of my time grading homework and tests, working with students on their projects, and running errands. I got to spend a lot of time working on the renewable energy and alternative building projects. In addition, I lived with a new host family.

The new renewable energy project involved storm proofing and re-wiring the wind turbine that I had helped build the previous year. The team added new components to the system so that the turbine operated more smoothly, and so that blades could be quickly removed in the event of a storm. The program's alternative building team built a schoolroom in a part of town known as Las Malvinas. With a lot of hard work, stellar teamwork, and the help of many locals, the Las Malvinas team was able to design and construct a larger classroom, with walls supported by recycled bottles, and complete with two handmade doors, windows, and a tiled floor. The team received donated materials from community members and nearby factories. The alternative building team also made papercrete bricks, which are made of shredded paper, sand, cement, and water. These were the first papercrete bricks to be used in a structure in DR. The schoolroom provides seating for 25 additional students. A third group worked to successfully upgrade the existing rainwater catchment system. The catchment system is estimated to save the school 300 Dominican Pesos per week. In addition to improving upon last year's system, the team also installed a rainwater catchment system on the Las Malvinas schoolroom.

Being the Teacher's Assistant provided a new set of exciting challenges. Being able to work on multiple projects, while applying the knowledge I had gained the previous summer, was the highlight. I felt that my time management and problem solving skills were taken to new heights.

Santo Domingo is a fun and very interesting city, and participating in the HSU Dominicana Program has provided me with an amazing experience. The program has been a source of great personal growth, as it has helped me to develop my skills as an engineer, student and person. The hard work that is demanded by the program is well worth it because every day brings a new, exciting and challenging experience.

I have noticed that the program has had profound impacts on nearly every person involved. I believe the program's success is due to its unique structure. Unlike many abroad programs, the HSU Dominicana Program arrives on site with questions, not answers. The program asks the community what its needs are, and projects are created to address those needs. The unique structure allows students and community members to work and learn together to solve problems.

END

River Bank Stabilization

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a work environment conducive to learning.

On a typical work day my job begins in the field, and one of my favorite activities is collecting data. I enjoy spending the weekend on the river in the warm sunshine while Arcata is fogged in. We go out with two teams of three to five people each. One team of biologists collects data on plants: species, maturity, health, density, and root depth. I'm on the second team, consisting of engineering students who primarily collect topographical data using a total station. This data includes five cross sections delineated perpendicular to the flow path, a longitudinal profile encompassing the entire reach both above and downstream of the revetment, and any other site-specific data of importance. The cross sections are marked using semi-permanent rebar pins so that we can return and re-survey them throughout the project. We rotate the roles of total station operator and target holder to allow for equal experience using the total station. I enjoy being the target holder because I get to walk the length of the survey and stretch out my legs, which sometimes involves wielding a machete while scrambling through thick blackberry bushes.

During site visits, we also collect other data such as stream bed material, revetment rock size and placement, stream flow rate, revetment design characteristics, areas of active erosion, dissolved oxygen and water temperature. It generally takes two days to survey each site, and field work often takes place on weekends. This involves driving, hiking, standing in rivers, and sunshine – all perks of the job.

One thing I've learned from this project is that for every one hour of fieldwork there are many more hours in the office, compiling and analyzing the data collected that day, as well as preparing for the next site visit. When we get back to the office after completing our field work, I process the data in Excel and generate figures for each cross section in AutoCAD, and sometimes also in GIS. These figures can be compared over time to determine the stability of the revetment at that location. We statistically analyze the bed material to determine its distribution, calculate flow rate, and compare actual rock size to the design sizing.

I accepted this position having some experience in AutoCAD from a previous internship and the Intro to GIS course at HSU, but it took additional practice before I felt proficient using the data environment and figured out how to make quality figures in a reasonable timeframe.

I believe my experience from this job will help me in my future career dealing with water resources, as I am constantly learning about rivers. On every trip to the field I pick up some new knowledge that could not have been taught in a classroom. Having the river and revetment in front of me and seeing how the channel changes due to different stresses sure beats a lab exercise.

I've found the work on this project to be both challenging and engaging, and when I graduate I hope to work on similar projects, either for a government agency like Caltrans or for a private firm. I plan to work with rivers and wetlands, creating natural systems designed to improve habitat and water quality. **END**

Alumni Profiles

Continued from page 3

I took several energy-related classes and was a member of the Renewable Energy Student Union (RESU). I also conducted research related to fuel-based air quality issues. In addition, I became interested in electronics while taking PHYX 315 and furthered this interest with the next electronics class. Today, I am developing an automated beer-brewing stand with my programming knowledge. In hindsight, I really wish I had pursued more internships or REUs (Research Experience for Undergraduates). I think these experiences would have been very helpful in giving insight into possible careers.

After graduating from HSU in December 2010 I moved back to my hometown of Roseville, CA, partly to search for a job, but mostly just to decompress. My neighbor while I was living in Eureka was married in January 2011, and I attended the wedding. After the wedding I helped clean up, and I began a conversation with another guest, the man who later became my boss. He was surprised that I had knowledge of solar water heating as this is not something that comes up in regular conversation. The next day we spoke again, and he told me about a job opening at his company, Fafco Inc. I applied for the position, and three weeks later I started my first engineering job.

Fafco manufactures solar water heating collectors and systems. While the manufacturing side has been a steep learning curve for me, I am thankful that I still have opportunities to learn and increase my knowledge. I have worked on several exciting projects here at Fafco, including designing and helping to build the largest solar water heating system installed under the California Solar Initiative Program. The knowledge I gained from Solar Thermal Engineering, Fluid Mechanics, and Thermodynamics at HSU gave me the knowledge and skills I needed to design this 20,000 square foot system.

I have found that working with groups is the most valuable lesson I learned at HSU. I cannot emphasize enough the amount of time you will spend working with others throughout your career. Also, I advise students to explore alternative methods of finding jobs when they graduate. You never know where a job might pop up, so put yourself out there. **END**

ERE Clubs Information Board

Compiled by Lianna Winkler-Prins, ERE Junior

Organization	Fall 2012 Activities	Spring 2013 Planned Activities
Environmental Resources Engineering Student Assn (ERESA) **Email:** eresa@humboldt.edu **Webpage:** http://www.facebook.com/hsu.eresa	• Coffee Table • Welcome Back BBQ • Pizza with Professionals • Fall Follies • Tours of engineering firms • All Clubs Meeting	• Coffee Table • Mock Interviews • ERE Rafting Trip • Graduation Reception
Engineers Without Borders (EWB) **Email:** humboldtewb@gmail.com **Webpage:** http://www.humboldt.edu/ewb **Donate:** http://www.ewb.usa.org/chapters.php?ID=597	• Movie Night • Tamale Feed / Sales • Poker Night with 50-50 split of profits going to EWB and the winner • Sister City Project's I-Block Party • Continue projects in Camoapa, Nicaragua with North Coast Professional EWB	• With North Coast Professional EWB, continue work on projects in Camoapa, Nicaragua • Collect precipitation data
Renewable Energy Student Union (RESU) **Email:** resu@humboldt.edu **Webpage:** http://resu.humboldt.edu **Mailing List:** renewable_energy_student_union@google.com	• Recruit new members (Join mailing list at left) • Complete solar hot tub project • Feasibility study for an HWMA solar array • On-campus biodiesel project • Potential projects with EWB • On-going: SORMS data collection	• Recruit new memebrs (Join mailing list at left) • On-going: SORMS data collection
Society of Women Engineers (SWE) **Email:** swe@humboldt.edu **Webpage:** http://humboldt.edu/clubs/club_sites/society_of _women_engineers1	• Brown Bag Lunches • Annual SWEshi • STEM (Science Technology Engineering and Math) advocacy in local elementary schools	• Hold 3rd annual SWE Social (Local woman engineers provide insight & inspiration) • ERE end-of-year BBQ • Girl Scout day • STEM (Science Technology Engineering and Math) • PRO (Pressure Reduced Osmosis) project with ERE Assistant Prof Andrea Achili

Get Involved: Learn, Lead, Help, Enjoy

REU in Bioengineering
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primary interest. From those ten I was accepted into one. I have a passable GPA (by which I mean it doesn't help or hurt), but I do have a fair amount of extracurricular involvement and professional experience every summer, and my acceptance rate was 10%. The lesson from this is to apply broadly (resist the temptation to be overly selective), and don't give up. It can be discouraging to get rejected repeatedly, but the experience is worth a continued effort if any of the graduate school aspirations aforementioned ring true for you.

I attended the RISE (Research Internships in Science and Engineering) REU program at UC Santa Barbara in bioengineering, which I can confidently say has changed my life. As far as the work goes, my project was not concrete when I arrived and I was able to shape it to my interests. I ended up working with Matlab and R (both programming environments) to improve existing software used for a project identifying biomarkers (expressed genes) for Post-Traumatic Stress Disorder (PTSD). Mentorship varied for different interns: most interns had grad student mentors that were pretty hands-on, but mine was a post-doc and very hands-off, which I preferred. The nature of my work meant I got my own office and scheduled my own hours, aligning my schedule with my mentor's only when I needed assistance.

I received a stipend of $3,500 which was meant to cover food, travel and other expenses. Interns were expected to work approximately 35 hour weeks, although this varied among interns due to the demands of the project they worked on. There were periodic deadlines supporting the development of our final presentation and paper, effectually distributing the work evenly throughout the summer. There were also presentations put on by researchers in other disciplines, as well as workshops on developing and presenting research papers. The focus of the REU was to educate and expose students to research, unlike my experience interning for industry, where the primary goal was to evaluate your performance as a potential employee. Most importantly, the REU work experience left me inspired instead of weary, indicating that graduate school might be the right path for me.

Given the nature of the work schedule, there was a lot of free time which I spent ensuring I was maximizing my fun. I loved Santa Barbara and tried to explore everything it had to offer. I enjoyed lots of beach time, bike riding, hot yoga, hiking, shopping, new restaurants, night life, and most importantly, hanging out with the other interns. What I took away from what I fondly call 'My Summer in the Dream Life' is as much a product of the relationships I formed as the work I conducted. Living with other interns in the same position allowed for the development of strong bonds faster than possible with peers at school. I saw how diverse our country is, but also how many similarities I have with people from drastically different backgrounds. I even managed to make one friend whom I still talk to every day – sometimes you're just lucky. Professionally I have not only expanded my network into the bioengineering field, but gained a contact and reference of an established postdoctoral researcher who I worked closely with. These relationships are invaluable, and more than the research, have made a permanent impact on my life.

REUs are worth the effort: the tedium of filling out applications, the blow to your confidence if your application is denied, recovering from the doldrums and trying again – it's all worth it. "A mind that is stretched by a new experience can never go back to its old dimensions." An REU is a minefield of new experiences. I began this piece hoping to relay everything I had learned, but I realized that would constitute a novel. Don't let opportunities like these pass you by without being able to say you gave it a shot. **END**

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Curriculum Corner

by Mike Anderson
ERE Emeritus Professor

Change in G.E. Area E

Effective Fall 2012, ERE students are no longer required to take a separate Area E course. If you entered HSU in Fall 2012 or later, or if you entered prior to Fall 2012 and have already taken an Area E course, you do not need to take any action. However, if you entered HSU prior to Fall 2012 and have not taken an Area E course, to take advantage of this change you MUST choose your graduation year as your "Catalog Year" on your Graduation Contract. See your ERE Faculty Advisor for details.

Possible Change in Sci/NR Elective Course EMP 377 "Intro to GIS"

EMP 377 may be changed to a lower division course beginning Fall 2013. If you want to take EMP 377 and be sure it will count for your Sci/NR elective, take it next semester, Spring 2013. See your ERE Faculty Advisor for details. **END**