
California State University,
Chico



14th Annual
College of Natural Sciences
Poster Session

Full Abstracts

WELCOME

This session was established to highlight research conducted by the College of Natural Sciences faculty and their student researchers. The session embodies the vibrant research environment of the College, and excitingly, several of these posters will also be displayed at CSU Chico's Gateway Science Museum.

AWARDS CEREMONY

CSU Chico faculty will select posters that they deem meritorious in the categories of Student Class Projects, Undergraduate/Faculty Research, and Graduate/Faculty Research. Poster session attendees will also select posters to be awarded the title of "People's Choice" within these categories. Awards will be presented to the winners in the student and faculty research categories during the awards ceremony at 3:30 PM. The awardees will receive a certificate, and their names will be added to a plaque displayed outside the College of Natural Sciences office in Holt Hall.

THANK YOU!

The poster session committee would like to extend their sincerest thanks to the faculty judges for their efforts. The committee would also like to thank all of the poster session attendees. This year's poster session committee members are:

- Robin Donatello (MATH) (chair)
- Rosio Huizar (NSC)
- Hannah Aird (GEOS)
- Robert Dubie (BIOL)
- Monica So (CHEM)
- Gayle Kipnis (NURS)
- Lauren Housley (NFSC)
- Anna Petrova-Mayor (PHYS)
- Benjamin Van Dusen (SCED)

POSTER SESSION SCHEDULE

Set up 10:00 am - 11:00 am
Open to General Public 11:00 am - 4:00 pm
Presenters at Posters 12:30 pm - 2:30 pm
Award Ceremony 3:00 pm - 4:00 pm

POSTER INFORMATION

Faculty

ID	Author List	Title
F1	Eric Ayars	Development of a high-resolution coincidence counter using the Cypress PSoC
<p>Abstract: One of the key requirements for a successful single-photon quantum optics experiment is the ability to count coincidences between various detectors. This is often done using Field-Programmable Gate Array (FPGA) chips but there are significant advantages to using the combined analog/digital/microcontroller capabilities of Programmable System On a Chip (PSoC) silicon. Here we demonstrate a 4-input, 8-channel PSoC-based instrument capable of counting coincidences at MHz rates with sub-25ns time resolution. This device can count up to 8 channels of user-configured coincidences, with adjustable noise-rejection level and input impedance. Performance of the device is comparable to that of commercial units costing multiple thousands of dollars, and it's readily adaptable for other experiments such as muon telescopes and even basic half-life measurements.</p>		
F2	Ben Van Dusen & Jayson Nissen	The Multifaceted Issue of Equity in Physics Classes: A Learning Assistant Study
<p>Abstract: This study compares equity in 112 first-semester college physics courses from 17 institutions using three different operationalizations of equity. The courses used a mix of traditional and collaborative learning pedagogies. We disaggregated the collaborative-learning courses by those that use Learning Assistants (LA) to support small-group activities and those that do not. To create a more complete picture of whether these classroom contexts supported equity, we compared student outcomes using three different operationalizations of equity (Equity of Outcomes, Equity of Learning, and Equity of Individuality). The analysis focused on student's scores on concept inventories administered as pretests and posttests using hierarchical linear models. The multilevel data came from the Learning About STEM Student Outcomes (LASSO) database and includes student-level data (demographics, pretest, and posttest scores) from 5,959 students and course-level data (use of collaborative learning and LAs) from 112 courses. Findings indicate that more learning occurs in courses that use collaborative learning with and without LAs than in traditional courses but that the gaps in absolute gains remained constant across the different types of instruction. These two findings lead to mixed equity results in which some operationalizations of equity are achieved and others are not. We discuss the implications of these mixed findings and the potential for misdirection and confusion that they create. Our conclusion is that researchers should identify their goals and operationalize equity prior to analyzi</p>		

Graduate/Faculty Research

ID	Author List	Title
GF1	Katie Williams, Julie Holland, Joan Giampaoli	Preliminary Psychometric Testing of a Novel Implicit Association Test of Infant Feeding Attitudes (BRST-IAT)
<p>Abstract: Background: Breastfeeding attitudes are a potent predictor of breastfeeding intention as well as behavior. Little is known about the congruence of implicit and explicit breastfeeding attitudes. Additional knowledge may yield improved intervention strategies. Research Aim: This study aimed to evaluate validity and reliability of a novel test (BRST-IAT) designed to measure implicit attitudes toward breastfeeding and formula feeding. Methods: A convenience sample of 30 expectant women were recruited via Facebook and word of mouth to complete the implicit measure (BRST-IAT), a survey containing demographic and infant feeding questions, as well as an explicit measure of attitudes, the previously validated Iowa Infant Feeding Attitudes Scale. Results: Iowa Infant Feeding Score significantly predicted score on BRST-IAT ($b=.028$, $R=.349$, $p=.001$) which indicates good convergent validity. Criterion validity was also strong with intended duration of breastfeeding emerging as a strong predictor of BRST-IAT as well ($b=.136$, $R=.150$, $p=.017$). BRST-IAT displayed sufficient internal consistency as measured by the Spearman-Brown split half method (.57). Stepwise multivariate regression explained 59% of the variance in BRST-IAT and included the Iowa Infant Feeding Attitude Scale, intended duration of breastfeeding, education level and intended infant feeding method. Conclusions: This preliminary validation indicated the BRST-IAT may be of some utility in identifying those most likely to benefit from additional breastfeeding support. The strong association between intended dur</p>		
GF2	Stephanie Parker, Don Miller	The Impacts of Gall Size and Shape on Housekeeping Behavior of the Gall-inducing Aphid, <i>Tamalia coweni</i>
<p>Abstract: There are multiple traits we use to define sociality in insects. Often, we associate colonial insects such as bees, ants and termites, with eusociality. When we expand sociality to include defensive and housekeeping behavior, we can analyze the varying levels of sociality in insects such as galling aphids. After inducing a gall on a leaf, the founding female aphid will raise multiple generations of offspring that live and feed inside the gall. In some species of galling aphids, specialized soldier castes defend the colony and remove waste from the gall, a housekeeping behavior. Analyzing housekeeping behavior alone suggests that some aphids we consider nonsocial exhibit many of the same behaviors as social galling aphids. <i>Tamalia coweni</i> induces galls on manzanita species and does not have a recorded soldier caste. Unlike other galls, <i>T. coweni</i> galls do not have an opening that waste may be actively pushed out of, instead we are seeing housekeeping behavior in the form of arranging the exoskeletons in clustered lines at the corners of the gall. This arrangement occurs in galls on one species of manzanita, <i>Arctostaphylos viscida</i>, and not on another, <i>A. manzanita</i>. This study seeks to quantify the arrangement of cast exoskeletons, as well as the differences of gall size and shape between the two species of manzanita that may be driving this difference in behavior. This rudimentary housekeeping behavior would indicate an independent evolutionary origin of more complex sociality in <i>T. coweni</i>.</p>		
GF3	Drew Gilberti, Chris Ivey	Understanding Sweet Bottom-Up and Top-Down Trophic Cascades- <i>Disholcaspis eldoradensis</i>
<p>Abstract: Trophic interactions may provide insight into understanding the distribution and abundance of organisms. Predators and producers influence other trophic levels through unexpected and complex interactions. The wasp <i>Disholcaspis eldoradensis</i> induces galls on valley oak trees, which are distinctive for their secretion of nectar. The nectar attracts ants which reduce parasitism of wasp larvae within the galls. I propose to test the hypothesis that parasitoid attacks on galling wasps is influenced by both lower and higher trophic levels. A factorial experiment has been designed that will systematically test every trophic level within the system. Host trees, ants, and nectar will be stimulated or impaired in order to measure their respective influence on parasitoid attacks on gall wasps, thus gaining insight on the distribution and abundance of the wasp.</p>		

ID	Author List	Title
GF4	Sean Lucas, Jay Smart, Ann Bykerk-Kauffman	The Painted Gorge fault, a potentially active dextral fault in the northeastern Coyote Mountains, Salton Trough, California
<p>Abstract: The NW-trending Painted Gorge fault (PGF) of the Coyote Mountains of southern CA is sandwiched between two major seismically active dextral faults (Elsinore and San Felipe). The Fault Activity Map of California classifies the PGF as pre-Quaternary (>2.6 m.y. in age). But we document several 0.5 m scarps along the PGF across multiple Quaternary terraces, implying post 2.6 m.y. motion. Previous mapping depicts the PGF as multiple disconnected normal fault segments. But our mapping reveals that it is a continuous dextral fault with 1 km of offset, similar to that of the EF and suggesting that the PGF may be just as seismically active as the EF. Furthermore, the Coyote Mountains, located between the EF and the PGF, are cut by a dense network of NW-striking dextral faults and NE-striking sinistral faults, forming ladder-like patterns. These patterns suggest that the region between the EF and PGF is undergoing distributed dextral shear that, like the two faults, may be seismically active.</p>		
GF5	Katherine Jensen, Ed Slattery, Lauren Housley	Sulforaphane reduces proliferation of triple negative breast cancer cells
<p>Abstract: Triple negative breast cancer (TNBC), an aggressive breast cancer phenotype with limited treatment options, is diagnosed in approximately 35,000 new breast cancer cases each year in the United States. Since cancer progression is linked to the supportive role of healthy cells found in the tumor microenvironment (TME), new cancer therapies are being sought that disrupt the recruitment and supportive activity of localized cells such as tumor associated macrophages (TAMs). Sulforaphane (SFN), a well-tolerated isothiocyanate derived from cruciferous vegetables, may prevent the progression of TNBC and alter cell-to-cell communication in the TME. SFN has been shown to directly decrease cell viability in TNBC cell lines and reduce tumor growth in animal models. However, there is a critical need to determine SFN action in the TME of TNBC to assess SFN as a potential component of TNBC treatment and chemoprevention. Objective: The objective of this study was to determine if SFN was effective at decreasing cell proliferation and invasion of TNBC cells (MDA-231) grown under the influence of TAMs, representing a more complex environment compared to TNBC cells grown alone. Methods: A cell culture study, employing a conditioned media approach to model non-contact interactions found in the TME, using THP-1 human monocytes and MDA-MB-231 human TNBC cells. THP-1 cells were differentiated in 50% (v/v) cancer-conditioned media to create TAMs. MDA-MB-231 cells were then grown in either non-conditioned media or 50% (v/v) TAM-conditioned media. TAM-educated and non-conditioned MDA-MB-231 wer</p>		
GF6	Allen LaGrange, Kristen M. Kaczynski, Jeremy R. Shaw, Kirsten Bovee	Response of Wet Meadow Vegetation along a Hydrological Gradient after Passive Restoration
<p>Abstract: We examined the response in wet meadow vegetation post hydrological restoration. We set out to determine if the seedbank can be a primary source for passive revegetation. OBL and FACW seedbank species were germinated in all plots along the hydrological gradient. We compared the seedbank and emergent vegetation using Sorensen's similarity index and found a higher similarity for OBL and FACW species than for FACU and UPL species. Vegetation surveys showed that FACU species cover decreased in drier plots, while the wettest plots were dominated by OBL and FACW species. The regeneration of OBL and FACW species are not constrained to seed producing species. Two rhizomatous species <i>Carex simulata</i> and <i>Juncus balticus</i> were able to propagate in varying hydrological conditions. Vegetation was driven predominantly by; depth to water, soil moisture, organic matter and organic carbon. Our results provide evidence that passive revegetation can be a successful strategy after hydrological restoration.</p>		
GF7	Nicholas M. Balfour, Carlos A. Estrada, Rebecca A. Pilakowski, Dylan K. Stompe, Amanda L., Banet	Impact of increased incubation temperature and thermal stress on the aerobic scope and thermal tolerance of juvenile rainbow trout (<i>Oncorhynchus mykiss</i>)
<p>Abstract: Recent research has investigated the impact of higher temperatures on sockeye salmon (<i>Oncorhynchus nerka</i>) and found that increased incubation temperatures resulted in lower thermal tolerance later in life by decreasing critical thermal maximum (CTmax). The oxygen and capacity limited thermal tolerance hypothesis (OCLTT) proposed by Prtner provides one possible explanation. This hypothesis suggests that the thermal tolerance of aquatic ectotherms is limited by insufficient oxygen delivery to cells. We hypothesize that fish exposed to high temperatures early in development will exhibit reduced aerobic performance later in life, as compared to fish incubated at lower temperatures. We also hypothesize that this difference will be magnified when fish are swimming in high temperature waters. To test this, we reared rainbow trout eggs in three temperature treatments: 50F, 55F and 60F. After hatch, CTmax and aerobic performance of fish were measured across a range of swimming temperatures.</p>		

ID	Author List	Title
GF8	Payton Laurie, David L. Stachura	ccl44 plays a key role in hematopoietic stem and progenitor cell proliferation
<p>Abstract: Blood development is a complex and highly regulated system where hematopoietic stem and progenitor cells (HSPCs) differentiate into the numerous types of cells that make up the hematopoietic system. Understanding the genetic and molecular pathways involved in this process is an important step to treating many diseases associated with the blood system. Due to the conservation of this system and many of its genes across vertebrate species we turn to zebrafish (<i>Danio rerio</i>) as a model organism. Three cell lines from sites of hematopoiesis were isolated, which expanded HSPCs when they were plated on these stromal cells. With the use of RNA sequencing we compared transcript expression of these three stromal cell lines and generated a list of 447 genes that we believe are important regulatory factors in the hematopoietic system. A highly expressed transcript from these cells was chemokine (C-C motif) ligand 44 or ccl44. In order to test its effect on hematopoiesis we performed knockdown experiments using morpholinos (MOs). Transgenic zebrafish lines with fluorescently labelled myeloid, erythroid, and lymphoid cells were injected with ccl44 MO and a decrease in those cell lineages was observed with the help of flow cytometry, fluorescence microscopy, and quantitative RT-PCR. Further characterization of ccl44 could have clinical importance for HSPC expansion and treatment of diseases like anemias and leukemias.</p>		
GF9	Rebecca Belmonte, Erin Ahn, and David L Stachura	SON is necessary for proper blood maturation
<p>Abstract: Zebrafish (<i>Danio rerio</i>) is an excellent model organism for studying embryonic vertebrate development due to its conserved genome with humans, external development, and ease of observation under the microscope. Previously, we showed that mutations in the mRNA splicing co-factor gene SON cause spinal and brain malformations in human and zebrafish. We performed these studies by knocking down the expression of the zebrafish homolog of SON in zebrafish at the single-cell developmental stage with specific morpholinos (MOs). In addition to the brain and spinal malformations, we also observed abnormal blood cell levels with SON knockdown. Decreased levels of SON resulted in impaired blood flow and changes to the amount of red blood cells, thrombocytes, and myeloid cells. As we continue to investigate SON and its effect on blood development, we will be able to establish how over- and under-expression of this gene negatively impacts human health.</p>		
GF10	Tina Hanson, Stephanie Aguiar, Skylar Tomasetti, Kallie Griffin, Sofia Rodriguez, Jesse Smith, David Stachura, Carolyn Arpin	Analysis of novel inhibitors of the GRB2 SH2 domain that decrease proliferation in chronic myeloid leukemia
<p>Abstract: Chronic myeloid leukemia (CML) is caused by a chromosomal translocation linking the breakpoint cluster region (BCR) gene to the Abelson murine leukemia viral oncogene-1 (ABL1). Once transcribed, BCR-ABL causes an over-proliferation of myeloid cells. Downstream of BCR-ABL is growth receptor bound protein-2 (GRB2). BCR-ABL binds with the SRC homology-2 (SH2) domain of GRB2 accelerating leukemic transformation. We created four novel SH2 antagonists and tested their effects on the growth of a human BCR-ABL+ leukemia cell line and found significant growth reduction. To verify the mechanism of action, an enzyme-linked immunosorbent assay (ELISA), a biacore assay, and a cellulose nitrate filter assay were performed. These assays indicated that our molecules do antagonize GRB2, bringing us closer to determining a key mechanism in CML oncogenesis.</p>		

ID	Author List	Title
GF11	Elizabeth Bianchini, Analucia Barragan Trejo, Raymond Bogiatto, Robin Donatello, Magdalena Plancarte, Walter Boyce, Troy Cline	Characterizing the ecology of avian influenza virus in waterfowl in the Pacific Flyway
<p>Abstract: Recent human infections with influenza viruses of avian origin highlight the need for continued surveillance of avian influenza viruses (AIV) in waterfowl. In 2014, highly pathogenic avian influenza (HPAI) H5N8 first detected in South Korea entered North America through the Pacific Flyway, a major migratory route for waterfowl, and caused outbreaks in poultry in the United States. California's Sacramento Valley is an important wintering site for waterfowl from which avian influenza viruses may be isolated. To better understand the risk posed by avian influenza viruses circulating in California, we collected cloacal swabs from 2,066 hunter-killed ducks across three hunting seasons at different locations in the Sacramento Valley. Sixteen waterfowl species were represented in our sampling. The presence of influenza viruses in cloacal swabs was determined by PCR for the matrix gene. The overall prevalence rate was 10.5% with diverse HA and NA subtypes represented. We observed a significantly higher positive rate in 2015-2016 (19.9%), a phenomenon that may be related to overcrowding on wetlands due to drought conditions. Northern shovelers had a statistically higher carriage rate (21.3%) relative to other species. Of particular interest, we detected HPAI H5 influenza viruses by PCR but were unable to retrieve an egg isolate. Three H7N3 isolates were obtained and, given recent human infections with H7 viruses, were characterized with respect to in vitro replication kinetics in mammalian tissue culture. All three H7 viruses were capable of replication in mammalian cell culture at</p>		
GF12	Dylan Stompe, Nick Balfour, Stacey Alexander, Amanda L. Banet	Habitat-specific Diet Analysis of Sacramento Pikeminnow (<i>Ptychocheilus grandis</i>) and Striped Bass (<i>Morone saxatilis</i>) in the Sacramento River
<p>Abstract: California native fish populations have experienced decline in recent years. One possible cause of decline is predation, which may be exacerbated by the presence of non-native predators, predator size class effects, the presence of man-made structures, and hatchery rearing effects. In an effort to quantify predation and identify associated factors, we examined the diets of non-native striped bass and native Sacramento pikeminnow within the lower Sacramento River. Sampling was conducted twice weekly during 2017 via hook-and-line sampling along a 22-mile section of the Sacramento River, in Butte County, California in addition to haphazard fyke trap sampling in Sacramento, California. Striped bass and Sacramento pikeminnow stomach contents were recovered via gastric lavage and are to be examined with the aid of qPCR to determine habitat, size, season and species specific diets. Quantification and analysis of predator diets with the use of Pinka's Index of Relative Importance and non-parametric statistical methods will afford insight into the effects of predation on vulnerable Sacramento River native fish populations.</p>		
GF13	Brandon Ertis, Carrie Monohan, Allan James, David Brown	Using LIDAR, ArcGIS, and on-the-ground data collection to describe geomorphometric characteristics of hydraulic mining features in the Yuba River watershed
<p>Abstract: The impacts of gold-mining practices in the Sierra Nevada that originated over 150 years ago and continued for approximately a century afterwards continue to affect water resources in northern California today. This study uses a recently developed airborne LIDAR dataset, ArcGIS, and field work to study hydraulic mining features (HMFs) in selected subwatersheds of the Yuba River basin, the most heavily hydraulically-mined in the Sierra Nevada. In the Willow Creek subwatershed, 8 hydraulic mines (with a total volume of 20,000,000 m³) and 4 downstream sediment deposits (with a total volume of 600,000 m³) were identified and characterized. This means only 3% of the volume mined is held in these sediment deposits (although others exist). Additionally, using the LIDAR dataset, additional potential HMFs were identified and conservative volumes were estimated. The study demonstrates that airborne LIDAR can be an effective tool for identification and analysis of HMFs.</p>		

ID	Author List	Title
GF14	Kirstie Steiner, Malory Brown, Sandra Martell, Betsey Tamietti, Emily Fleming	Meddling with microbial tubes: sheath production by Leptothrix cholodnii SP-6

Abstract: Metal-oxidizing bacteria like *Leptothrix-Sphaerotilus* generate complex surface structures to avoid becoming entombed within an iron or manganese crust and to remain suspended in the water column. These bacteria possess cellular machinery to generate a highly ordered organo-metallic fibrillar microtubule sheath and have been generating these structures for hundreds of millions, if not billions of years. While the sheath structure is well known to be composed of long polysaccharide fibrils bonded by amino acids, the microtubule sheath assembly machinery and regulation of sheath production is unknown. Determination of sheath-related genes has been complicated due to a lack of a tractable genetic system in these metal-oxidizing bacteria. We developed a genetic system, obtained several sheath mutants using transposon mutagenesis, and identified the genes that were disrupted. Of these mutants, many either overproduced or did not produce sheaths. The genes associated with these mutants are connected to motility, suggesting a link between sheath production and motility. To confirm a specific gene's involvement in the observed mutant phenotypes, we will reconstruct the mutant from wild-type using targeted gene deletion. Lastly, we obtained natural sheathed and sheathless variants and will sequence their DNA and use bioinformatics to identify more potential genes involved in sheath production.

Undergraduate/Faculty Research

ID	Author List	Title
UF1	Sungwon Yoon, Monica So	Sponges for Decontaminating Water with Persistent Organic Pollutants
		<p>Abstract: Contaminated water with high levels of persistent organic pollutants (POPs) is becoming a huge threat to the health of humans. If ingested, POPs are accumulated in the fatty tissue or organs, which can lead to disruption of the endocrine system and cancer. Metal-organic frameworks (MOFs), which is a sponge-like material made up of metal cations and organic linkers, can be used for removing POPs from polluted water sources. In this work, we hypothesized that hydrogen bonding affects water filtration efficiency. Using solvothermal methods, we synthesized and characterized two metal-organic framework (MOF) powders, UiO-66 and NH₂-UiO-66. We found that both porous and crystalline MOFs decontaminated the water with a carcinogenic dye, but UiO-66 was almost twice as fast at doing so. Therefore, the experiment rejected our original hypothesis, and instead suggested that surface area has a larger influence than hydrogen bonding in the MOF in effectively decontaminating water.</p>
UF2	Sandra I. Arellano, Kristen F. Gorman	Detection of Scoliosis Gene, cMed2, during Embryonic Development
		<p>Abstract: Idiopathic scoliosis (IS) is an abnormal spinal curvature. The cause of IS has been unknown for thousands of years, but we are making progress in discovering the disease's biology. Historically, IS was considered exclusive to humans because it is not observed in quadrupedal animals. However, the fish model <i>Oryzias latipes</i> has a lineage with heritable scoliosis that is similar to IS. Human studies have not identified IS causative genes. Prior genomic work in the <i>O. latipes</i> model has identified several candidate genes. One of these, cMed2, is not expressed in curved fish after hatching. The goal of my project is to assay cMed2 during development. I hypothesize that there will a lack of expression during development. Total RNA will be extracted from pools of curved and normal embryos, and then converted to cDNA. Using primers designed for the cMed2 transcript, I will then amplify parts of the gene. Amplicons will be run on electrophoresis gels. A band is anticipated if the gene is expressed. Results will help with understanding the molecular pathways associated with the etiology for IS. This may lead to improvements in healthcare for how efficiently IS is treated.</p>
UF3	Quoc Viet Nguyen	Analysis of Hydrocarbons in Urban Storm Water Using Gas Chromatography-Mass Spectrometry
		<p>Abstract: Hydrocarbons are widely used in our society and can be found in many products such as propane in gasoline and naphthalene in mothballs. These organic compounds are made of hydrogen and carbon atoms and store a large amount of energy in their bonds, which makes them good fuels and construction materials (e.g., asphalt and plastics). However, hydrocarbons are toxic to humans and aquatic life. In urban settings, storm runoff picks up hydrocarbons from paved surfaces and can decrease aquatic health. The goal of this project is to analyze hydrocarbons in urban storm water to monitor water quality and consequently improve human health. We adapted standard EPA methods for liquid-liquid extraction and analysis of semi-volatile organic compounds by Gas Chromatography- Mass Spectrometry. This work utilized a Diesel Range Organic standard mix and a Polycyclic Aromatic Hydrocarbons standard mix to identify and quantify hydrocarbons in runoff.</p>
UF4	Xochith Herrera, Jayson Nissen, Ben Van Dusen	Student Outcomes Across Collaborative-Learning Environments
		<p>Abstract: The Learning Assistant (LA) model supports instructors in implementing research-based teaching practices in their own courses. In the LA model undergraduate students are hired to help facilitate research-based collaborative-learning activities. Using the Learning About STEM Student Outcomes (LASSO) database, we examined student learning from 112 first-semester physics courses that used either lecture-based instruction, collaborative instruction without LAs, or LA supported instruction. We measured student learning using 5959 students' responses on the Force and Motion Conceptual Evaluation (FMCE) or Force Concept Inventory (FCI). Results from Hierarchical Linear Models (HLM) indicated that LA supported courses had higher posttest scores than collaborative courses without LAs and that LA supported courses that used LAs in laboratory and recitation had higher posttest scores than those that used LAs in lecture.</p>

ID	Author List	Title
UF5	Robert Gruenberg, Sandrine Matiasek	Effects of prescribed fire on soil physical and chemical characteristics.
<p>Abstract: Prescribed fire is utilized to reduce fuel loads which can limit the extreme nature of firestorms in California. The goal of this project is to evaluate the change in topsoil nutrients and soil characteristics after a controlled burn. Big Chico Creek Ecological Reserve (BCCER) has dealt with the fire prone nature of the mixed chaparral canyon by reducing fuel loads through prescribed fire. A controlled burn was implemented late November 2017 at Milkweed Meadow, located on a landslide bench perched on a BCCER canyon wall. Soil samples were collected before and after the controlled burn for bulk density, particle size distribution, and nutrient analyses including pH, nitrate, phosphate, and salinity. By gathering data before and after low intensity fires, a better understanding of how controlled burns affect the nutrient pool can be formed. This knowledge could help with timing and planning of controlled burns.</p>		
UF6	Carolynn Arpin, Kelsey Hanson, Natalie Holmberg-Douglas	Investigating the Therapeutic Potential of Grb7 Modulation
<p>Abstract: The overexpression of the human growth factor receptor 7 protein (GRB7) has been correlated to multiple types of cancer and is utilized as a therapeutic target for exponential cell growth. Inhibition of GRB7 has proved to decrease the fitness of breast cancer cell lineages and reduce the likelihood of pancreatic cells metastasizing in mice. GRB7 acts as an adapter protein by binding its signaling partners with its Src Homology-2 domain (SH2). The activity of the adapter protein can be manipulated by use of small molecules that bind to the GRB7 SH2 domain. These small molecules mimic natural binding substrates with high affinity for GRB7 SH2 domain, rendering the protein ineffective. Our GRB7 SH2 domain inhibitors utilize a photochemical process to induce a domino reaction yielding the compound core. Our work has shown that the domino reaction is time sensitive. By altering experimental conditions, we are developing molecules with the highest percent yield and purity.</p>		
UF7	Michael R. Smith, Hsin-ya Kuo, Danrui Ni, Aubrey R. Paris, James E. Park, An Chu, Teresa Tang, and Andrew B. Bocarsly	Microwave-Assisted, Low-Energy Development of PEGylated PdCo Alloy Nanoparticles for Electrocatalytic CO ₂ Reduction
<p>Abstract: Investigations regarding the architectural manipulation of unique and less energy-intensive CO₂ reducing nanoparticles have been of specific interest due to their environmental applications in combating global warming. Herein, we have developed a low-energy method of synthesizing PdCo alloy nanoparticles with a specific affinity for CO₂ reduction by utilizing: a solution-based bimetallic cyanogel network, a conventional microwave for low-energy alloy synthesis, and polyethylene glycol (PEG m.w. 6000) as a soft template for nanoparticle design. Electrolysis experiments showcase an affinity for the reduction of CO₂ into formate with a faradaic efficiency of 29.58% and 0.99% for the nonPEGylated and PEGylated alloys, respectively.</p>		
UF8	Karin Metzgar, Alex Vorboril, Carissa Leveille, Abdullah Albazroun, David G. Alexander, Colleen A. Hatfield, Shahroukh Mistry	Designing an Automated Counter for Monitoring Bat Roosts
<p>Abstract: Bat boxes are a common method for providing roosting habitat in urban environments. While bat boxes are increasingly popular, little data exists on their occupancy or the emergence patterns of bats. The current methods in place for counting bat populations are expensive, inaccurate, and high maintenance. The primary goal of this project is to design and build a data acquisition system that will monitor the roosting patterns of the bat population living within the bat boxes at BCCER, the University Farm as well as produce a prototype that could be universally adapted to most bat boxes. The data collected will measure the daily ingress and egress of the bats, the timing of activity patterns as well as allowing for the study of correlation with daylight, temperature and seasonality. The population data gathered from this system will allow researchers to better understand bat box occupancy rates, seasonal patterns of bat abundance, and help in future bat box design and placement.</p>		

ID	Author List	Title
UF9	Christopher Burkett	The Effects of Urban and Woodland Fires on Air Quality
<p>Abstract: This project aimed to look at how urban wildfires affect air quality. The Atlas and Tubbs fires were chosen to test this hypothesis. Both of these fires were in the same climate, of similar size and both started and stopped at approximately the same time. The main difference between the two is the Tubbs fire had burned 5,643 structures; while the Atlas fire only burned 781 structures. The majority of the Atlas fire was over woodlands. To collect the data this project used the permanent and temporary air quality sensors located within proximity of both fires. Due to the higher urban density of the Tubbs fire, it is hypothesized that there will be much higher concentrations of fine particulates downwind of the fires. These fine particulates cause unhealthy and dangerous conditions to individuals in the affected area.</p>		
UF10	Jocelyn Bermudez, James Matthews, Ceara Purcell, Nancy DeWitt, Zachary Meisel, Hannah Aird	Exploration of Precious Metal Mineralization in the Ann Mason Porphyry Deposit
<p>Abstract: The Ann Mason porphyry deposit is the fourth largest undeveloped Cu/Mo deposit in the world. Mineral assay data from Mason Resources show high gold (Au) and silver (Ag) concentrations (=0.06ppm) are present in the bornite-chalcopyrite (Bn-Cpy) and chalcopyrite-pyrite (Cpy-Py) zones, associated with potassic alteration, and in the pyrite-chalcopyrite (Py>Cpy) zone associated with propylitic alteration. Precious metal mineralization in this deposit has not been well studied. Using a scanning electron microscope and energy-dispersive x-ray spectroscopy, 30 thin sections were analyzed for their Au and Ag mineral species, and textures of host mineral assemblages. Preliminary data show the Bn-Cpy zone has the highest proportion of precious metal species, with the most prevalent being Ag₂Te and AuAg concentrated within bornite. The species and distribution of precious metals affect the type of extraction methods, in addition to understanding how precious metal bearing porphyry deposits form.</p>		
UF11	James Calvo, Monica So	Improving Water Filtration Efficacy of Nanosponges by Varying Metal Cations
<p>Abstract: Persistent organic pollutants (POPs) are organic molecules present in polluted water which may cause damage to organisms by accumulating in their fatty tissues and organs. Metal-organic frameworks (MOFs) are a type of porous material capable of removing POPs from water. They are composed of metal cations and organic linkers. We synthesized two MOFs, ZIF 8 and ZIF 67, which share the same organic linkers but contain different metal cations. We hypothesized that different metal cations would result in different adsorptivities of POPs. We found that both MOFs are crystalline, porous, and can uptake POPs, like acid orange 7 dye. Future work includes quantifying the porosity of the MOFs and more in depth testing of metal effect on adsorption of POPs.</p>		
UF12	Michael Doris, Carissa Leveille, Joseph Levine, Will Mixer, Jason Mickel, Dr. Hyewon Pechkis, Dr. Joseph Pechkis, and Dr. Anna Petrova-Mayor	Progress Towards Construction of A Magneto-Optical Trap to Study the Spinor Dynamics of a Bose Thermal Gas
<p>Abstract: We present our progress towards creating ultracold gases to study the spinor dynamics of a Bose thermal gas. We have designed, constructed, and tested low-cost, external-cavity diode lasers (ECDLs) to operate below the rubidium D2 transition at 780 nm for use in an undergraduate-only research laboratory. The ECDL operates in a Littrow configuration with a mode-hop free range of 1-2 GHz and a linewidth of less than 6 MHz. The trap and repump lasers will be frequency-stabilized using a sub-Doppler Dichroic Atomic Vapor Laser Lock (DAVLL). The locking electronics are discussed, as well as the vacuum chamber design.</p>		
UF13	Karsten McDonell, Kristen F. Gorman	Investigation of Differential Gene Expression in Japanese Rice Fish with Idiopathic Scoliosis Phenotype
<p>Abstract: Idiopathic scoliosis (IS) is a prevalent deformity with no known cause. It is defined by abnormal spinal curvatures that occur after birth and during pediatric growth. For this reason, IS has been considered a post-natal syndrome. The goal of my project is to investigate the expression of an IS candidate gene (cMed2b) during development. I hypothesize that there will be different expression in curved versus normal embryos. My work uses a strain of the Japanese Rice Fish, <i>Oryzias latipes</i>, with non-induced genetic scoliosis as a model. Gene expression will be measured at various time points during development by RT-PCR, in order to identify differential expression. Results of this experiment will contribute to an understanding of a genetically complex disease, as well as provide a foundation for future work.</p>		

ID	Author List	Title
UF14	Amy Robson, Angelica Rodriguez, Rachel Teasdale	Alteration assemblage of the hydrothermal system at Sulphur Works, Lassen Volcanic Center
<p>Abstract: The Lassen Volcanic Center (LVC), located at the southern end of the Cascade Volcanic Arc, includes the hydrothermally active area of Sulphur Works (SW) which is three miles to the southwest of Lassen Peak in the core of ancient Mount Tehama. The water temperature at the hydrothermal area ranges from 84o C-91o C and pH varies from 2.2-3.5. SW is situated between West Sulphur Creek to the west (pH =6.4) and Tophet Springs to the east (pH=4.7). Samples were collected across a 150m x 50m area at SW. Mineral assemblages include silica polymorphs, kaolinite, montmorillonite, jarosite and pyrophyllite. Silica phases indicate decreasing temperature from west to east across Sulphur Works, across which proportions of clay minerals increase. Clay mineral abundances indicate argillic alteration, and only the Big Boiler site has higher temperature phyllic alteration. Hydrothermal alteration at the Maidu Volcanic Field resulted in a similar clay mineral assemblage that formed at temperatures from 175oC-275oC (John et al., 2008). Additional sampling and analysis will be used to determine mineral trends across a vertical transect of LVC, from Sulphur Works to Pilot Pinnacle.</p>		
UF15	Jessica Shippen, Kristen Kaczynski	An Analysis of Vegetation Functional Groups Post Hydrologic Restoration
<p>Abstract: Historic and recent modifications have altered the hydrologic processes that sustain montane wet meadows and fens. Over the past 25 years progress has been made in fen and wet meadow restoration, but few long term studies exist evaluating restoration success. We examined the long term restoration success of Drakesbad Meadow, a fen wet meadow complex in Lassen Volcanic National Park. In 2012 phase two of the restoration occurred when two ditches were filled with sediment and sedges were planted. In 2017 we examined changes in vegetation functional groups within restored ditches and adjacent meadow plots. We found that within the filled ditches the mean percent cover of sedges was lower and the mean percent cover of forbs was higher compared with adjacent meadow plots. Monitoring both the long and short term changes in vegetation post restoration can help us assess the effectiveness of current restoration techniques and can help us create more effective methods moving forward.</p>		
UF16	Sara Lewis, Saachi Jhandi, David Ball	Syntheses of a Model Compound for the Analysis of the Conformational Preference of 2-Bromo-3,3,5,5-tetramethylcyclohexanone
<p>Abstract: 2-Bromo-3,3,5,5-tetramethylcyclohexanone is the target of a conformational analysis study for an undergraduate integrated laboratory course. This project aims to supplement the course with a bicyclic bromoketone as a model compound in the study to generate spectroscopic data utilizing a wide range of different polarity solvents. The yield of the first three steps of a four step synthesis of the bicyclic cyclohexanone is improved, and an alternate synthesis is in progress. The alternate synthesis proposes two novel steps after a Grignard addition to chloroacetic anhydride and subsequent rearrangement.</p>		
UF17	Ryan Beane, Todd Greene	Using compositional changes in well samples to map the top of the Tuscan Aquifer in the Chico area.
<p>Abstract: The Tuscan Formation was formed 3.2 to 1.8 million years ago by a series of lahars sourced from the Yana Volcanic Complex in the Lake Almanor area. The Tuscan Formation covers approximately 2000 square miles (5100 square km) along the Chico Monocline. It is important to map and understand the stratigraphy and composition of the Tuscan Formation due to its importance as the main aquifer for Chico and surrounding areas. The objective of this study is to map the upper bounding contact of the Tuscan Formation in the subsurface. By collecting cuttings samples from water wells within Chico, CA, we created thin sections to observe the mineral composition at different well depths. By point counting and identifying 300 grains per slide we can determine whether the sample is within the Tuscan Formation based on the percentage of volcanic grains relative to younger deposits which consist of a mixture of volcanic and metamorphic grains. By correlating the change in composition to well depth, we can then use geophysical logs to map the top of the Tuscan at different well sites to create a top-Tuscan subsurface map.</p>		

ID	Author List	Title
UF18	Carolynn Arpin, Matthew McDonald, Juan Diaz, Nicholas Barnett	Developing a Drug Displacement Assay for the Undergraduate Laboratory
<p>Abstract: Our goal is to provide a hands-on laboratory experience for drug design through the development of a displacement assay experiment into the undergraduate organic chemistry lab. The assay will evaluate the ability of different drugs to bind to the active site of apohemoglobin (AHb), which is hemoglobin without the presence of heme inside the active site. Our experiment involves the fluorescent complex of anilino-naphthalene-1-sulfonic acid (ANS) coordinated to the active site of AHb. When ANS binds to AHb the protein emits fluorescence. Molecules will then be introduced with an affinity for the active site in AHb and ANS will be displaced through competition with the introduced drug. This will lead to a decrease in fluorescence, which will be observed through fluorescence spectrometry. We are currently developing this displacement assay with known controls and will soon utilize competitive drugs. Project motivation, design, current progress, and preliminary results will be presented.</p>		
UF19	Daniel Wheeler, Jack Robertson, John Schad, and Dr. Paul Arpin	Verifying the Accuracy of an Optical Translation Stage
<p>Abstract: The objective of this project is to build an instrument to measure ultrafast dynamics in molecules. Ultrafast dynamics can be used to study light harvesting interactions such as photosynthesis or photon detection in eyes, which happens in the order of femtoseconds. When completed, this device will excite molecules with a short laser pulse and then characterize the state of the sample with a time delayed "probe" pulse. The time delay is controlled by increasing the optical path length for the probe laser pulse with a highly accurate motorized optical translational stage. Additionally, a computer program that can automatically control the motor and record data is needed. The program we have developed allows users to enter parameters with a presentable interface. We tested the resolution of the optical stage with a Michelson interferometer and obtained a step size resolution of 340 nm. While the goal was 50 nm resolution, the results enable calibration in future measurements.</p>		
UF20	Cameron Divoky, Trevor Moore, Colleen A. Hatfield, Shahroukh Mistry	Pallid Bat Seasonal Activity in Northern California
<p>Abstract: <i>Antrozous pallidus</i> is a Species of Special Concern in California and a State Vulnerable species. Previous studies of <i>A. pallidus</i> have focused mainly on behavior and roosting patterns, with limited information available on long-term seasonal activity. This study examines patterns of seasonal activity in <i>A. pallidus</i> at three sites in northern California, ranging from the Central Valley to the Cascades. Activity was documented daily for 3 years using acoustic data loggers at the Eagle Lake Field Station, Big Chico Creek Ecological Reserve and the CSU Chico University Farm. Bat species identity was established using SonoBat software. <i>Antrozous pallidus</i> showed the greatest seasonal activity in the summer (June-July) with minimal activity during the winter months (November-February). This pattern was most noticeable at BCCER. This indicates seasonal migratory activity by pallid bats and a preference for oak woodland habitat with adjoining rock outcrops, over valley agricultural landscapes.</p>		
UF21	Emily Egusa, My Lo Thao, Daniel Edwards, Tara Burns, Larry Kirk, Larry Hanne	Characterization of Bacterial Degradation of Polyhydroxybutyrate
<p>Abstract: Polyhydroxybutyrate (PHB) is a biodegradable bioplastic that has been used to replace conventional, petroleum-based plastics. PHB can be both synthesized and degraded by bacteria. This research project has focused on the isolation, identification, and characterization of bacteria that can degrade PHB. Eight PHB degrading bacteria were isolated from the environment and polyhydroxybutyrate depolymerase activity was determined on PHB-nutrient agar plates. One isolate, <i>Acidovorax wautersii</i>, was chosen for further investigation based on its high levels of depolymerase activity. Results in liquid culture indicated that the enzyme is inducible and highest activity occurs between 4-8 hours following PHB exposure at 36C. SDS-PAGE comparison of concentrated supernatant from PHB induced cultures showed a band at approximately 60 kDa, not present in the uninduced samples. The primary breakdown product of PHB was determined to be the monomeric unit, 3-hydroxybutyrate (3HB), by HPLC analysis.</p>		

ID	Author List	Title
UF22	Christopher Cummings, Christian Garcia, Tara McColm, Kevin Soils	A Review of Stream Health Data Analyses of Federal, State, and Local Survey Protocols
<p>Abstract: The objective was to review and compare various stream ecosystem health data analyses used in federal, state, and local protocols. This project provides a description of multiple stream survey methods and protocols used to quantify overall stream health conditions within Big Chico Creek, located in Chico, California. The selected protocols include: the Stream Condition Inventory, the Greenline Monitoring Method, Quality Assurance Project Plan, and the California Integrated Assessment of Watershed Health. This project outlines proper protocols that can be performed within a given section of the stream in order to develop optimal management practices while finding inadequate attribute fields. The preliminary results based on the array of collected data used in each protocol indicate that the California Integrated Assessment of Watershed Health is the best suited protocol to be used in providing accurate stream health assessments.</p>		
UF23	Bryn Copson, Dr. Sandrine Matiasek	Fate of Heavy Metals in Urban Stormwater Biofiltration Systems
<p>Abstract: Urban storm runoff picks up heavy metals from roads and buildings before flowing into streams during precipitation events, having negative effects on aquatic ecosystems. Biofiltration systems are a popular, low impact practice using soil, plants, and microbial communities to mitigate heavy metals from stormwater through sorption, uptake, and degradation processes. To evaluate the fate of heavy metal removal in biofilters, five native plants and a control were tested in columns in a greenhouse using synthetic stormwater. Biofiltration columns were filled with layers of pebbles, sand, local loam soil, and mulch. Total metal concentrations (Cu, Pb, Ni, Cd, Cr, and Zn) were measured in water before and after filtration. Heavy metal content was analyzed in the plants and soils, before and after six applications of synthetic stormwater. This research can be used to inform management practices of biofiltration systems, including disposal of heavy metal plant and soil waste.</p>		
UF24	Trevor A Moore, Cameron Divoky, Colleen A. Hatfield, Shahroukh Mistry	Activity Patterns of the Western Red Bat, <i>Lasiurus blossevillii</i> , in Northern California
<p>Abstract: <i>Lasiurus blossevillii</i> is a tree-roosting bat found throughout the western United States. It is present year-round in the Central Valley, however, the seasonal migratory patterns in the state are not well understood. The aim of this study is to examine the seasonal activity patterns of <i>L. blossevillii</i> in Northern California. Using acoustic recordings, we examined the activity patterns at three different habitat types: an agricultural area in the valley, canyon and ridge oak woodland, and a pine-juniper forest. Species were identified using SonoBat software. <i>Lasiurus blossevillii</i> had the highest levels of activity during June and July across all sites, with the pine-juniper forest showing the greatest activity. The lower elevation sites retained low levels of activity throughout the winter suggesting temperatures warm enough for occasional foraging. The site in the valley showed a late-year increase in activity during October and November, possibly indicative of migratory activity.</p>		
UF25	Evan Davis, Chad Dodge, Rachel Teasdale	FLOWGO model for the emplacement of a lava flow near Pavonis Mons on Mars
<p>Abstract: Without sample return missions from Mars, there is a gap in our knowledge of lavas emplaced there. To characterize lava flow emplacement on Mars, we use the FLOWGO model (Harris et al., 2000; Rowland et al., 2004). We examine a 173km flow in the Pavonis region that has a channel width of 26.7 km and channel depth of 49 m (Glaze et al. 2009). Rheologic and environmental parameters were based on other Martian flow models (Rowland et al., 2004; NASA, 2016). Temperature is calculated using MELTS (Gualda et al. 2012) with an analog composition (McSween et al. 2003). Crystal proportions in the model are adjusted until the model produces the true length. Model outputs produce a flow velocity of 0.0054 m/s, which is slower than lavas on Earth. This is expected given that Mars' gravity (3.71 m/s²) is lower than Earth's. With further refining of the FLOWGO model and new analog flow experiments, we expect to better constrain parameters that cannot be directly observed or measured. Our goal is to model Martian flows to constrain crystallization and cooling parameters and model the emplacement of this, and other extraterrestrial flows.</p>		

ID	Author List	Title
UF26	Eric S. Dearden, Dr. Sandrine Matiassek	Continuous Monitoring of Bioswale Discharge at Butte College, CA
<p>Abstract: Two primary functions of a bioswale are flood mitigation and pollution control through improved infiltration and biofiltration of urban storm water. To gauge the performance of the BWELL bioswale at Butte College, pressure transducers were deployed to continuously monitor discharge. Flows were measured in flumes and weirs during storm events in March 2018. During one event, discharge was combined with storm water sampling to calculate pollutant loads for nutrients and heavy metals. Our results provided a detailed understanding of storm characteristics and drainage properties of the system including drainage area and response time. Further development of flow monitoring will provide insights on the performance of the bioswale on storm runoff mitigation.</p>		
UF27	Tayari Coleman and Dr. Eric Ayars	Characterizing the time sensitivity of a coincidence detector
<p>Abstract: Building a sensitive coincidence detector is one thing (see E. Ayars, "Development of a high-resolution time coincidence counter using a Cypress PSoC chip" at this session) but once that's done it's important to check to see if the time resolution is actually as good as was planned. To do this, we needed to be able to generate two pulses with a well-controlled time interval between them. The time interval needed to range from 5 to 100 nanoseconds. Our solution was to build a PSoC circuit that generated a primary pulse that triggered an RC delay circuit and a subsequent secondary pulse. By varying the RC time constant we could reproducibly generate pulses with controlled time intervals between them and verify the operation of the coincidence detector.</p>		
UF28	Daniela Melchor, Carolyn Arpin	Synthesis of a GRB2 SH2 Antagonist with a Phosphate Mimetic
<p>Abstract: GRB2 (Growth Factor Receptor-Bound Protein 2) is key for intracellular transduction and functions as an adaptor protein. Previous research has linked GRB2 to oncogenic signaling, making it a viable therapeutic target. Inhibition of the GRB2 homodimer has shown to decrease the viability of various cancer cells. The GRB2 SH2 (Src Homology 2) domain enables the protein to bind to its partners. Small molecules rationally designed to bind to the GRB2 SH2 domain modulate protein function and disable its ability to bind to signaling partners. Our goal is to synthesize a known monomeric GRB2 antagonist that will eventually be dimerized and utilized to inhibit the GRB2 homodimer. The dimerized antagonist is designed to mimic phosphotyrosine binding residues that bind to GRB2 SH2 domain. Our initial work on the monomeric antagonist showed that it did not enter cells due to the presence of a phosphate group. Therefore we are now working to incorporate a phosphate mimetic into the antagonist.</p>		
UF29	Lisa Ott, Meghan Riddell	From Orchids to Biodiesel: Coco coir as an effective drywash material for biodiesel fuel
<p>Abstract: The push for renewable and sustainable energy to replace fossil fuels has continually increased in recent years. As such, the production of biodiesel has been increasingly popular among consumers. After being prepared by a simple chemical reaction, biodiesel must be "washed" to remove impurities such as soap and glycerol. These impurities have emulsifying properties that are destructive to the diesel engine. As biodiesel is produced, the conventional wash method uses approximately the same amount of water to wash, creating a large aqueous waste stream. To ensure that biodiesel is a truly sustainable fuel, a dry wash method must be employed for the purification of biodiesel. In this paper, we study a coconut coir filtration system, which removes excess soap, glycerol and methanol from biodiesel, leaving a purified product and reduces the amount of aqueous waste generated by the production of biodiesel. Importantly, coconut coir is sustainable, inexpensive and effective.</p>		
UF30	Angelica Rodriguez-Arriaga, Amy Robson, Rachel Teasdale	Geochemical trends of the hydrothermal system at the Lassen Volcanic Center
<p>Abstract: The Lassen Volcanic Center (LVC) is located at the southern end of the Cascades Volcanic Arc in Northern California. The hydrothermal system of the LVC includes hot springs, fumaroles, mud pots, and boiling pools and is the largest and most active in the Cascades range. This work investigates geochemical trends at Sulphur Works. Oxygen isotopes (d18O) characterize hydrothermal fluids in that, magmatic fluids have increased d18O relative to meteoric water. We test whether drought years impact d18O signatures of hydrothermal fluids. 2008 was a drought year, when peak snowpack was 113.8 in and d18O was low (-4.3 to -5.1; Mendes et al., 2008) and 2017 was a non-drought year when peak snowpack was 266.4 in and d18O was high (-1.4 to -3.4). In 2000, mud pot d18O compositions and drought conditions were intermediate between 2008 and 2017 (-2.5 to -4.2; Janik & Bergfeld, 2010 and snowpack 178.4 in). These trends indicate that isotope compositions are not a function of time, but also do not decrease in wetter years. We investigate whether magmatic water overprints meteoric inputs or if recharge rates delay the impacts of high precipitation on water isotope compositions.</p>		

ID	Author List	Title
UF31	Margaret Pierce, Chad Dodge, Rachel Teasdale	Recreating Lava Emplacement of the Axial Seamount
<p>Abstract: Axial Seamount is a submarine volcano on the Juan de Fuca ridge. Crystallization rate and emplacement was investigated for a flow that erupted in 2015. Previous studies correlate crystal content with flow emplacement (Gregg and Fornari 1998). The percent volume of crystals from a sample was determined by analyzing an SEM image, which revealed that the sample contains 1.25% crystals and 98.75% glass. Emplacement time and flow velocity were approximated by comparing volume of crystals with flow thickness and length. Sonar maps from the 2015 expedition provided the flow length (1601 m), thickness (1 m), and depth at which the sample was collected (1771 m) (Chadwick, 2015). Correlations of crystal content and flow thickness predict more than 1000 days were required for flow emplacement, which is an order of magnitude too large for the span of the eruption. This disparity may be related to crystal growth after emplacement. Future experiments will explore post-emplacement crystallization.</p>		
UF32	Will Mixter, Jason Mickel, Dr. Hyewon Pechkis, Dr. Joseph Pechkis, and Dr. Anna Petrova-Mayor	Guiding High Energy Laser Light through Fibers
<p>Abstract: Nd:YAG lasers are widely used in science research, industry, and medicine. High energy pulsed lasers can give off electromagnetic fields or vibrations and therefore it is often desirable to use fiber optic cables to guide the light away from the laser. The common silica-core fibers used in optical communications are not suitable for high-energy laser light. We explored the option of hollow-core fibers. We characterized two types of hollow core fibers (coated and uncoated) in terms of their efficiency and induced polarization effects, as the polarization state of the transmit beam through the fiber is critical for some applications.</p>		
UF33	Austin Pollard, Jared Sweatman, Jose Luis Baranda, and Dr. Nicholas Nelson	Tracking Buoyant Magnetic Loops in a 3D Stellar Dynamo Simulation
<p>Abstract: The magnetic activity observed in Sun-like stars can strongly impact the potential habitability of Earth-like planets, just as our Sun's magnetic activity impacts the Earth's atmosphere and magnetosphere. We model the generation of stellar magnetism through convective dynamo action and how magnetic fields can bundle together into loops and rise from the deep interior to the surface of the star as sunspots. The rise of magnetic loops has been modeled using the thin flux tube (TFT) approximation and, more recently, using full 3D magnetohydrodynamics (MHD) simulations. Analysis tools were developed to compare the results of 3D MHD models with TFTs. Some preliminary results have suggested that TFT models underestimate the coupling between rising magnetic structures with the surrounding convective flows, suggesting that further refinement may be necessary to better achieve agreement between the two models.</p>		
UF34	Chad Dodge, Rachel Teasdale, Jennifer M. Wenner	Emplacement of Basalt Lavas of the Poison Lake Chain in the Lassen Region of the Southern Cascades
<p>Abstract: Cinder cones of the Poison Lake chain (PLC; 100 ka) are located 30km east of Lassen Peak (Muffler et al., 2011). Flow emplacement of PLC lavas is characterized using 1-atm cooling experiments and quantification of groundmass plagioclase crystallinities for use as parameters in flow models. Measured flow length correlates with an effusion rate of 0.33 m³/s (Walker et al., 1973). Equilibrium experiments determine the eruption temperature was 1150C. Natural samples have 29.8% groundmass plagioclase crystals, which correlates with cooling experiments at 10C/hr. Crystallization continued down flow and distal samples record increased groundmass plagioclase crystallinities (36.5%), which are best replicated by cooling experiments at 10C/hr for 100 and then cooled at atmospheric conditions (unquenched). Experimentally derived cooling rates correspond with a flow velocity of 0.8 m/s (Keszthelyi & Self, 1998). Natural flows are compared to Q-LAVHA models using emplacement parameters (Mossoux et al., 2016). This work shows that models and experiments can be used to describe flow emplacement conditions for lavas that are inaccessible during emplacement.</p>		

ID	Author List	Title
UF35	Matthew Boice, Peter Kure, David L. Stachura	Kallb
<p>Abstract: HSCs emerge in developing zebrafish from the wall of the dorsal aorta and migrate to caudal hematopoietic tissue (CHT) for expansion. Three cell lines were created from zebrafish tissues which support HSPC proliferation; zebrafish kidney stroma (ZKS), Zebrafish embryonic stromal trunk (ZEST) cells and Caudal hematopoietic embryonic stromal tissue (CHEST) cells. Prior studies conducted by Stachura labs have shown 447 overexpressed transcripts are shared among these hematopoietic supportive cell lines. Of these 447 transcripts, the one hundred highest expressing genes were analyzed and marked for further study. kallb was chosen for further investigation. In these investigations, morpholinos (MOs) are used to target the gene of interest (kallb) and reduce its expression. MOs are injected into a developing embryo in its first hours, and the development of the embryo is monitored. Survival rates of the embryos are measured, and the genes role in hematopoiesis is determined.</p>		
UF36	Victoria Coia, Kristen F. Gorman	The Role of cMed3 in Scoliosis Formation
<p>Abstract: Human idiopathic scoliosis (IS) is a genetic disorder characterized by an abnormal curvature of the spine. Between 0.5 - 10% of children around the world have IS. Because curve onset occurs after birth, the deformity is not considered congenital. Although it is known to be genetic, the biological basis of IS remains unknown. The goal of my research is to evaluate the expression of an IS candidate gene during embryogenesis. For my research I use the Medaka fish as a genetic animal model, and an inbred lineage having phenotypic similarities to IS. I will be evaluating the expression of my candidate gene (cMed3) at various developmental stages in two groups: curved and normal embryos. I hypothesize that there will be stages that show different gene expression in curved fish. If so, my results will demonstrate that IS has a congenital defect. The ultimate goal is to discover the biological basis for IS. This can contribute to improved screening methods for early detection of scoliosis.</p>		
UF37	Kyle Peterson and Dr. Eric Ayars	Single-Atom NMR model
<p>Abstract: As part of the development of a single-atom Nuclear Magnetic Resonance (NMR) model we have developed an air-bearing with built-in magnetic sensors. The air-bearing supports and constrains an acrylic sphere with an internal magnetic dipole so that the sphere rotates freely on all three axes. At the same time magnetic sensors in the air-bearing precisely measure the magnetic field due to the internal magnetic dipole, and from that field determine the exact orientation of the dipole. This is the first step in production of a single-atom NMR model. The completed device will have the ability to control the frequency and direction of all magnetic fields via a set of Helmholtz coils, allowing students to investigate all parameters of nuclear magnetic resonance in a macroscopic environment.</p>		
UF38	Grace Prator, and David M. Keller	CRISPR/Cas9 genome editing in human cells
<p>Abstract: The CRISPR/Cas9 genome editing system has recently emerged as a novel approach in biomedical research with applications in gene therapy. Coupled with a customizable guide RNA (gRNA), Cas9 endonuclease can induce double strand breaks in a targeted gene sequence, activating endogenous DNA repair mechanisms. With this study, we aim to address whether utilizing Cas9 nuclease co-expressed with a gRNA can edit the gene for green fluorescent protein (GFP) expressed in human embryonic kidney (HEK) 293 cells. Lipofectamine CRISPRMAX was used to deliver Cas9 protein and gRNA complexes into a GFP+ stable cell line of HEK 293 cells. Fluorescent microscopy was used to visualize significant changes in GFP fluorescence while Image J was used for quantification of the images. Here, we demonstrate that by transfecting Cas9 and gRNA into a GFP+ stable cell line resulted in two-fold reduction of GFP fluorescence. Because there was a significant decrease in GFP fluorescence, this suggests that we successfully edited the GFP gene in HEK 293 cells. We see this study as a pilot experiment and plan to apply the CRISPR/Cas9 system to other fields of research such as Type 2 Diabetes.</p>		

ID	Author List	Title
UF39	Crane Joshua, Hansen Emilee, Tiffani Anderson	Enhancing the Organic Chemistry Experience through Course redesign with Technology
<p>Abstract: Organic Chemistry for Applied Sciences (CHEM 108) is a streamlined course designed to serve as a background for the principles, language and laboratory skills of organic chemistry for students who are not science majors. The course demographics have posed many academic challenges due to the majority of students presenting negative attitudes towards the course and its difficult topics. This has translated to CHEM 108 traditionally resulting in a high DFW rate. In order to improve student attitudes and performance, the course was completely redesigned through the Course Redesign with Technology program. We investigated changes in student grades and overall attitudes towards organic chemistry through the use of online media, active learning strategies, and Supplemental Instruction. Multiple surveys were conducted and data was collected to assess the effects of these different pedagogical methods on student performance and attitudes towards the course.</p>		
UF40	He-Lo Ramirez, Christopher T. Ivey, Victoria L. Sork, Jessica W. Wright	Leaf trait variation in a <i>Quercus lobata</i> common garden experiment is not explained by climatic conditions of maternal seed source
<p>Abstract: Oak leaves are remarkably variable. Previous studies found that leaf morphology of some oak species covaries with climate, which may reflect local adaptation or plastic responses to climate. We tested the hypothesis that variation in leaf dissection and specific leaf area in <i>Quercus lobata</i> was genetically based. The study was conducted in a provenance test involving 672 maternal families collected from 97 locations throughout the range of the species. We subsampled leaves from 54 trees grown from 27 maternal families (9 locations) representing extremes and median of multivariate climate phenospace, used digital image analysis to measure shape, and weighed leaves to calculate specific leaf area. If variation in traits reflects adaptation to climate, we predicted that leaves sampled from trees originating from contrasting climates would contrast significantly in traits measured, even when grown in this common garden. Instead, we found no significant differences in leaf traits among the climate categories sampled, suggesting that the variation is largely shaped by local environmental conditions.</p>		
UF41	Teal Meyers, Sophia Phillips, Emily J Fleming	Links between mercury methylation and metal cycling microbes
<p>Abstract: Methylmercury is highly toxic and biomagnifies in aquatic biota, making it a critical environmental concern. Iron reducing bacteria (FeRB) and sulfate reducing bacteria (SRB) methylate mercury in freshwater ecological systems; however, the complete set of bacteria responsible for methylation in marine systems have not been identified. Previous studies have demonstrated that SRB are responsible for 50% of mercury methylation in these systems, the other 50% is undetermined. We propose that the other 50% of mercury methylation is done primarily by FeRB. In an Fe-rich, Hg-contaminated marsh we determined the total iron using ferrozine assays, the 16S rRNA community to identify organismal diversity, and total mercury. Initial observations suggest sediments with greater mercury are correlated with greater sediment-iron. Future work will determine the location of greatest mercury methylation potential using genetic markers. With these data we hope to predict the sediment types most prone to mercury methylation.</p>		
UF42	Dicha Perez-Montalvo, Carolina Alvarado	Just Science: Student Responses to Social Issues in Science
<p>Abstract: NGSS Framework for K-12 Science Education uses disciplinary core concepts to support students in developing critical thinking. We explore a course that promotes evidence-based argumentation through conducting inquiry experiments. This course, designed to guide preservice teachers in practicing these skills beyond the science classroom will create critically reflective individuals. As part of the regular curriculum, statistical data on inequities in the STEM fields was included. After exposing students to social justice issues in STEM, they were offered extra-credit assignments addressing this topic, requiring them to use evidence-based argumentation to participate in conversation on social justice. We analyze student's written responses and study their reactions to having explicit conversations of inequities in STEM in a science course. We consider embedding social justice topics within science courses, especially for future teachers, will support agency to change inequities in STEM.</p>		

Student Class Projects

ID	Author List	Title
S1	Vicky Caporale, Dayna Lucas, Mattison Myers, Kamee Vannorsdall	Hungry Wildcat Food Pantry Donation Drive
<p>Abstract: A 2016 California State University, Chico student research survey indicated that 46% of student respondents suffered from food insecurity. Food insecurity is proven to have negative effects on overall student well-being, academic performance, and graduation rates. For our senior public health nursing project, CSU, Chico senior nursing students partnered with the Chico State Hungry Wildcat Food Pantry and set a goal to increase donations and raise awareness about the Pantry among the campus community. Our efforts included an 11-week donation drive set up as a competition to see which of the five nursing semesters and faculty could donate the most items. We also held a one-day table event on campus to encourage donations and raise awareness about the Pantry. We set a goal to obtain 3000 item donations during the 11-week donation drive. We quickly surpassed this goal collecting over 3000 food donations and more than \$1500 in cash donations. To evaluate our efforts and success, surveys were given before and after the drive.</p>		
S2	Cab Esposito, Andre Fassler, Charity Zimmerman	Land Use Effects on Groundwater Levels in the Sacramento Valley
<p>Abstract: Groundwater availability is highly dependent on land use and urban water demand. We examined the effects of land use projections within the Sacramento Valley and how it impacts groundwater levels. We used the Central Valley Hydrologic Model (CVHM) to evaluate future scenarios. We have three scenarios, a Base Scenario, a land use Disturbed Scenario, and a Highly Disturbed Scenario. The two disturbed scenarios use land use projections from 2050 and 2080. We expect to see impacts to the groundwater when comparing the Disturbed and Highly Disturbed Scenarios to the Base Scenario. We will use hierarchical models to explain the change in groundwater level based on land use while accounting for the spatial correlation between land regions.</p>		
S3	Grace Solada, Autumn Hedrick	Improving Outcomes for Young Parents
<p>Abstract: Statistics have shown that teen mothers are much less likely to complete the education necessary to obtain a well-paying job. In fact, only 41% of mothers who have a child before the age of eighteen will ever complete high school (Schuyler Center for Analysis and Advocacy). With the implementation of the Fairview High School Project, our hope was to increase educational opportunities and emphasis on completion of school as well as continuing education to improve parent and children outcomes. This was implemented through the instruction of six classes over the course of two months.</p>		
S4	April Bischel, Andre Bourret, Evan Davis, Danny Fields, Nicholas Holt, Evan Mason, Margaret Pierce, Natalio Plascencia, Amy Robson, Corey Ritchardson-Fernandez, Neil Trent, Emily Truscott, Hannah Aird.	Interpreting the Magmatic Evolution and Emplacement of the Bald Rock Pluton through Geochemical and Petrographic Analysis.
<p>Abstract: The Bald Rock Pluton is a zoned intermediate granitoid pluton adjacent to Lake Oroville, CA, which contains mafic inclusions. Twelve BRP samples were analyzed using geochemical, petrographic, lithologic, and structural data to interpret the magmatic evolution and classify the inclusions as xenoliths or enclaves. Geochemical analyses and updated knowledge on plate tectonics help modernize the data and interpretations presented by Compton (1955) and Larsen and Poldevaart (1961). Lithologic and petrographic data revealed that the inclusions and host rock comprise different proportions of the same minerals. Structural and petrographic data revealed compositional zoning both throughout the pluton and within individual plagioclase crystals. Results indicate that the inclusions are enclaves formed from magma mixing. This study analyzes the evolutionary and diversification processes that occur in active magma chambers beneath arc volcanoes.</p>		

ID	Author List	Title
S5	Emmanuelle Cordier	Different Management Practices Affect Soil Health
<p>Abstract: The management practices implemented at Big Chico Creek Ecological Reserve (BCCER) and the effects on soil quality health is examined. BCCER implements five different management practices directed towards eliminating invasive species. The practices are 1)Burn 2)Mow 3)Burn and Mow 4)Burn, Mow, and Handpicked 5)Control. To determine soil quality; physical, chemical, and biological tests are performed. Measurements of EC, pH, N, P, K, soil carbon, and soil texture are taken. EC, pH, N, P, and K examine the chemical elements concluding the presence of salts, availability of plant nutrients, and plant macronutrients. Soil texture finds the percent of sand, silt, and clay indicating retention and transport of water and nutrients. Soil organic carbon is the basis for soil fertility. With all the parameters of the soils, health will be determined for different management practices. I predict the plot that is burned, mowed, and handpicked for invasive species will have the best overall health.</p>		
S6	Lorenz Bolts, Gavin Kirkreit	Choosing the Best College
<p>Abstract: The purpose of this research project is to determine an accurate way supported by statistics that can accurately rank colleges. Each year millions of students enroll in college each year and are investing tens of thousands of dollars into their future. It is important that students know whether or not a particular school or program is worth the investment and financial risk of taking out loans. There are multiple places and websites that do different types of rankings. Some rankings are based strictly on academics, while others rankings may do rankings based on affordability. These rankings can be helpful, however it is not always transparent how these rankings are created and if they are statistically viable or not. Schools overtime develop reputations throughout the years and that can create a innate bias in the rankings. Chico State for example has a reputation of a party school and that influences what people think of the institution. Our goal is to be able to create a model that combines the different factors, such as academics and affordability, that accurate ranks universities without bias. Once we are able to create a model, we can compare our model to the rankings of other sites and see which rankings are more similar to our. Also, we can manipulate which variables we use in the our model to see if that returns similar results to other rankings. A difference between the model we create and other rankings could be due not to bias, but those rankings prioritizing and using other factors. One huge variable that meant a lot to us in our was graduate incom</p>		
S7	Eddie Castro, Eislely Adoremos, Mizuho Taue	Weather Forecasts
<p>Abstract: Forecasting is a tool used for predicting future weather at a given location through application of current technology; these forecasts can provide a rough idea on future weather and help us make important decisions related to it. Weather forecasts are made by gathering as much historical and present weather data as possible to predict how it will change in the future. Since weather is a very complex system, weather prediction is not perfect; forecasts almost always include an error estimate. In this research, we will examine this error and the accuracy of weather forecasts, the likelihood of error, regionality, and the accuracy of long-term forecasts by analyzing the data from the National Weather Service website.</p>		
S8	Jennifer Silver, Lina E, Jamie Pizzo	Blood Donation: Misconceptions About Barriers to Blood Donation Amongst Chico State Students
<p>Abstract: Background: There are many misconceptions about blood donation. Since California implemented the Safe Body Art Act in July 2012, blood donation centers now accept blood from people with recent tattoos or piercings if he procedure took place in a state-regulated facility. However, Chico State students may not be aware of this act. Problem: Only 0.00006% of the student population donates blood at the monthly blood drive at Chico State. Our research asks, "Are there misconceptions about blood donation amongst Chico State students?" Methods: We used online and paper surveys for the pre-donation and post-donation survey of student perceptions about blood donation. Results: We determined how many Chico State students have misconceptions about blood donation. Public Health Impact: Addressing Chico State students' misconceptions to blood donation with education may increase blood donation rates in this population, making more blood available to our community.</p>		
S9	Micayla Dollinger	Diabetes: Don't Sugar Coat It.
<p>Abstract: One in ten people in the United States live with diabetes; it is predicted that one in three people will have diabetes in the year 2050 (Boyle, Thompson, Gregg, Barker, and Williamson, 2010). More children are affected by type 2 diabetes every year. In order to slow the increase of diabetes a program titled, Diabetes: Don't Sugar Coat It, was created. The program consists of a 50 minute diabetes education class and a pledge to make a healthy change. A total of 25 classes throughout Butte, Shasta, and Sutter counties received education. This program is an example of primary prevention in the community.</p>		

ID	Author List	Title
S10	Anne Landaker, Celina Hernandez	Mobile Mental Health
<p>Abstract: Crisis Text Line is a text service which users can access when in a crisis. They are connected to a trained volunteer whose purpose is to collaborate with the texter to de-escalate their crisis and discover coping skills for the future. The Crisis Text Line helps approximately 50,000 unique texters per month. Our goal for this project was to increase awareness of the Crisis Text Line and the resources it provides on the Chico State campus and local community. We collaborated with the Crisis Text Line to gain advertising materials which we posted on campus bulletin boards, at local coffee shops, and other areas where potential users might gather.</p>		
S11	Rebecca Albright, Jesus Martinez	Improving Oral Care for Homeless Clients of the Jesus Center
<p>Abstract: Oral health is an important topic in community health and one that leads to significant disease and disability. Evidence shows that homeless individuals are at a relatively higher risk for poor oral health and poor oral health literacy, due to the lack of access to oral health care. Because the homeless are at a high-risk, interventions are necessary to promote oral health among this population. As 5th-semester community health nursing students, we worked with the Jesus Center to provide information and education about oral health to its homeless clients. Through our program participants learned important basic facts about oral health, were provided with free dental supplies, and were put in touch with resources for local dentists accepting Medi-Cal.</p>		
S12	Brooke Hall, Kira Price, John Selzer, Louis Sterback	Is Pyrogenic Carbon, as a product of a broadcast control burn, an effective mechanism for local carbon sequestration?
<p>Abstract: This investigation of organic carbon in soil will determine if fire can effectively sequester carbon. Pyrogenic carbon (PyC) is created during high intensity fires under anaerobic conditions. This PyC can enter into soil through infiltration over time. Soil samples were collected before and after a prescribed burn on Doe Mill Ridge, in Forest Ranch Ca, from a total of 9 marked burn plots. Samples were analyzed for total organic carbon (TOC) and compared across the plots and sampling dates. Soil samples were analyzed using the Shimadzu, TOC analyzer. Samples must be prepared by removing all inorganic carbons, through volatilization, prior to analysis. The soil samples collected before the fire had expected amounts of carbon; 3.9%-5.2% by weight. We believe the recent rain after the fire greatly increased the flux of PyC into the soil. We hypothesize that PyC, generated by local prescribed burns, can be an effective carbon sequestration method.</p>		
S13	Kristen Morris, Ryan Rowe, Maison Power, Jake Jacobs	Hydropeaking in the Sacramento River
<p>Abstract: The goal of this project is to assess if hydropeaking is occurring on the Sacramento River below the Shasta dam and at what magnitude. Hydropeaking, an anthropogenic phenomenon, is the rapid fluctuation in water discharge. To understand if hydropeaking is occurring, we used unimpeded inflow rates into Shasta Lake as a control and compared them to the outflow rates at multiple locations downstream. We have compared these flow rates over different time scales: daily, monthly, and yearly on a series of graphs using R. In addition, we have conducted a paired t-test comparing the sub daily flow fluctuations at the highest and lowest peaks between the control and outflow. We found the change in flow rates are significantly different and the average change in flow rate for the outflow was higher than the inflow. This is a foundational study that will allow future time-series analysis on the hydropeaking events occurring within the Sacramento River.</p>		
S14	Madison Becker, Grace Boyle	Four Winds Health Education
<p>Abstract: Background We provided healthy lifestyle public health education to K-8th grade students at the Four Winds Charter School. We chose to target this population because we recognized that they have a lower socioeconomic status and oftentimes don't receive the necessary education to maintain an optimal healthy lifestyle. Purpose The purpose of this project is to provide education to help students acquire healthy behaviors, ultimately contributing to a healthier community. We aim to encourage not only our students, but also other schools in the community, to adopt a curriculum that raises health awareness. Methods We incorporated in-class activities, demonstrations, group discussion, and provided the students with supplies relative to each topic. We assessed students' understanding with pre-tests and post-tests. Outcome Our SMART objective: By May 12th, 2018, at least 80% of the Four Winds students will have improved their health habits and shown an increase of knowledge on various health education topics.</p>		

ID	Author List	Title
S15	Carissa Leveille, Angel Sanchez, Shannon Price, Brendon Dunahay	Lasers, Lasers, Lasers
<p>Abstract: We will present the results of three experiments conducted in the laser lab. First, we devised a method and wrote the procedure for aligning lasers that are mounted in a 6-knob ring mount. This alignment is always done by the instructor because it is challenging and time consuming compared to the typical two-mirror alignment. Second, we learned how to calibrate a scanning Fabry-Perot interferometer to quantify the spectral content of a laser beam. Finally, we improved the optical system used for the measurement of laser beam divergence. All of this contributed to expanding our hands-on skills and improving our understanding of lasers.</p>		
S16	Chad Dodge	The Riggs Fault Plane: An Updated View
<p>Abstract: In the Silurian Hills (20 miles north of Baker, Ca), a major low angle fault is exposed (the Riggs Fault) that places Paleozoic carbonates on Pre-Cambrian marine deposits (the Pahrump group). Previous work by Kupfer, 1960 classifies the Riggs Fault as a thrust fault while Bishop, 2015 suggests a slide block origin. This work uses updated aerial imagery, outcrop mapping, and petrographically derived kinematic indicators to constrain the nature of the fault and fault plane. A model of the Riggs Fault emplacement and an updated detailed map of the Riggs Fault contact with its associated structures are also presented. An understanding of the true nature of the Riggs Fault has large scale implications for the reconstruction of ancient tectonic processes operating in the Mojave province and paleogeographic reconstructions of North America.</p>		
S17	Kimberly Armstrong, David Ballowe, Sean Berriman, Emmanuelle Cordier, Brett Cote, Kaylie DeLuca, Eric Dearden, Chris Del Santo, Joseph Garcia, Cole Gleaton, Jake Jacobs, Francisco Preciado, Richard Prentice, Amanda Reinhart, Joshua Sandige, Jessica Shippen, Daniel Yambor, and Kristen Kaczynski	The impact of deer browsing on post-fire resprouting shrubs
<p>Abstract: The Tuscan fire burned over 11 hectares of chaparral just north east of Chico within the Big Chico Creek Ecological Reserve on September 25, 2017. Students in GEOS 365 were interested in the impact of deer browsing on post-fire re-sprouting shrubs. We walked four 300m long transects, stopping every 25m to record plot data. Data were collected on ash depth, burn severity, pellet counts and canopy type. We assessed the vegetation for number of browsed and unbrowsed resprouts as well as average and tallest resprout heights. We concluded that areas with high burn severity have the highest number of browsed plants. Oaks were the dominant species and were the most browsed. Furthermore browsed plants have the tallest average height. About 9% of sampled plots had deer pellets. With this information we are able to gain insight into the impacts of herbivory on chaparral ecosystems and to help design potential conservation practices to better manage our natural resources.</p>		
S18	Jerry Tucay, Mitch Borgert, Aaron Shaffer	An Investigation on America's Perception of Fake News
<p>Abstract: Fake news is described by Michigan Research Guides as being, "News stories that are false: the story itself is fabricated, with no verifiable facts, sources or quotes". News with fabricated facts can be difficult for many people to recognize. Using data from PEW Research Center we will investigate whether political affiliation, religious denomination and cultural identity affects how confident Americans feel about their ability to identify fake news stories. The data we have includes questions about how often people think they come across a fake news and how confident they are at identifying fake news. We have found that the respondents answers to the pew questions about fake news can be used to predict whether they have a more extreme political ideology. These questions do not do well at predicting religion or specific political parties.</p>		

ID	Author List	Title
S19	Felisa Vallejo	A survey of native and non-native plant populations on a managed California grassland at the Big Chico Creek Ecological Reserve
<p>Abstract: Non-native invasive species have the ability to completely change the presence and success of native plant populations when left unmanaged. In this study, plant surveys were conducted on a managed grassland at the Big Chico Creek Ecological Reserve using the point transect method in April 2017 and 2018. The total coverage of different species and diversity levels were determined by assessing fifteen randomly chosen transects on four treatment plots: burn, burn & mow, mow, and control. It was found that the total coverage of all plants in 2017 was lower in comparison to the total coverage in 2018. The largest difference between native and non-native species coverage for each year was seen in the mowed plots, with the smallest difference seen in the burned plots. Monitoring the changes in these plots can help to determine diversity levels in these grasslands and the effectiveness of the management methods. This will allow further development towards restoring native populations.</p>		
S20	Lauren Kellogg & Hailey D'atri	Everything Blood Pressure
<p>Abstract: The homeless population often doesn't have access or resources for adequate health care. High blood pressure accounts for an extremely large number of preventable heart disease and stroke deaths in the United States. Our community health project was to perform blood pressure screening at the Torres Shelter and provide supplemental education and resources they could access based on their blood pressure results. We also decided to ask some questions such as: their age, knowledge of their blood pressure history, why it is important, and what they can do to maintain a "normal" blood pressure. Our data output included the percentage of people with high blood pressure that we screened. Outcomes from our project include, 1.) an increased screening rate for this population, 2.) increased education level regarding blood pressure, 3.) resources that are available, 4.) knowledge of when to seek medical help, 5.) a self report on changes in diet, exercise, and general health care, and 6.) a long term outcome of decreased rates of hypertension among the Chico homeless population.</p>		
S21	Matthew Suttles	Lithologic and structural analysis of the chaos structure underlying the low-angle Riggs fault in Silurian Hills, CA
<p>Abstract: Faulting is best described by the observations made on real estates of material moving against each other. In Death Valley specifically, complex faulting termed as chaos structures are interpreted as existing only on one wall of a fault. Using standard field mapping techniques accompanied with aerial drone photography, the chaos structure in the Silurian Hills is understood to be a disorderly array of blocks and slices composed of rocks from the footwall. Previous mapping attempts have left chaos structures not fully understood and therefore the purpose of this study is to contribute to preceding efforts. A DJI Mavic Pro drone equipped with a 2.3 CMOS image sensor with 4K resolution was used to capture photographs of the field area hosting the chaos structure. Post processing of images using computer software such as Adobe Photoshop and Lightroom led to a more updated geologic map and more precise geologic understanding of chaos structures.</p>		
S22	James R. D. Robertson	The Impacts of Wildfire on soil characteristics
<p>Abstract: The goal for this project was to determine the effects that Wildfire has on soil physical and chemical properties. A Wildfire occurred in September of 2017 approximately five miles NE of Chico, CA on the northern side of state route 32. The fire burned approximately 40 acres of chaparral habitat within Bureau of Land Management, as well as Big Chico Creek Ecological Reserve. In February 2018 I collected soil samples both in the burned and unburned areas for analysis. Web Soil Survey soil maps and satellite images were used to identify a control site with the same soil series and similar vegetation. The soil samples were analyzed for bulk density, pH, electrical conductivity, soil organic matter, and nutrients. Studies that examine these effects on soils can provide information to land managers that can aid in ecosystem management.</p>		

ID	Author List	Title
S23	James Basinger	Study on Knowledge and Behavior of Self-harm in Teens
<p>Abstract: Suicide is a preventable cause of mortality constituting a California public health concern. Suicide was responsible for greater than 40,000 deaths in 2014, with rates increasing between 1999 to 2014 from 10.5 to 12.9 deaths per 100,000 population (Matthay, Galin, & Ahern, 2017). Shasta County possessed suicide death rates of 23.3 per 100,000 between 2014-2016, which more than doubled California's 10.2 deaths per 100,000 during this same period. Little to no research exists assessing both suicidality risk across the lifespan as well as implemented intervention efficacy in combating suicidality in Shasta County. The Study on Knowledge and Behavior of Self-Harm in Teens is a research project and community outreach program aimed at assessing suicide risk in Shasta County teens. It also while promotes suicide awareness and knowledge of available community and national suicide prevention resources. Shasta County 9th grade students were provided a presentation aimed at raising suicide awareness, reducing stigma, etc., which was prefaced with an anonymous survey assessing recent individual self-harm and/or ideation of self-harm. A pre- and post-test will be administered to determine efficacy of the provided intervention, and survey results were analyzed to determine severity of suicide risk in the target population.</p>		
S24	Michael Doris, Sam Forsberg, Elias Otten, John Schad, Daniel Wheeler	Refurbishing a Nitrogen laser and measuring the speed of light
<p>Abstract: The primary goal of this class project is to refurbish a malfunctioning Nitrogen laser that is used in the optics and lasers courses for several labs and projects. The laser is unique because it produces short pulses that will allow us to measure the speed of light. The secondary goal is to build a Michelson interferometer utilizing the Nitrogen laser and obtain the speed of light in air. At the poster presentation we will describe the repair process and discuss the results of the speed of light measurement. Through this project we have learned about the design and operation of pulsed Nitrogen lasers and enhanced our hands-on skills.</p>		
S25	Megan Luke, Mariby Cruz, Ricardo Aguilar	Effects of Lure Volatilization Rates on Walnut Husk Fly Trap Captures in Orchards
<p>Abstract: Walnut husk fly (WHF), <i>Rhagoletis completa</i> Cresson (Insecta: Diptera: Tephritidae), is an economically significant pest of cultivated walnuts in California. According to the California Department of Pesticide Regulation (CDPR) insecticide applications in walnuts increased approximately 135% from 2010 to 2015. The CDPR partially attributes this trend to an increase in pressure from WHF. Contributing factors are a lack of information in the field combined with a lack of distinct numeric treatment thresholds, which leads to prophylactic insecticide applications. This represents a substantial problem for sustainable production of walnuts. Better understanding WHF phenology and distribution in orchards may allow farmers to reduce significantly the amount of insecticide applied to orchards each year. Current management strategies include setting up insect traps with a sticky surface with ammonium carbonate lures at a rate of 2 traps per 10 acres of walnut orchard to monitor for the presence of WHF in orchards. Placement preference is given to "hot spots" where WHF has been observed or trapped in previous years. This study looks at trap capture patterns and volatilization rates in orchards (Bullseye, Dixon, Vann Bros.) where high density trapping has been implemented at 3, 6, and 12 traps per acre to determine if "hot spots" exist, or if they are simply a product of trapping methodology and lure efficacy. Volatilization rates were slightly left-skewed, with some of the higher volatilization rates coming from the Vann Bros. site.</p>		
S26	Bridget Hatton, Madison Winton	Mother's Strong
<p>Abstract: Perinatal mood and anxiety disorder (PMAD) is a term that encompasses a range of psychological health disorders from mild postpartum depression to severe perinatal psychosis. PMAD is one of the most underdiagnosed and undertreated complication of pregnancy and childbirth (Smith & Kipnis, 2012). The reality is that one in seven families in America are impacted by PMAD during pregnancy or in the year following delivery; more than 50% of women who suffer from PMADs are never identified (Zachik, Hogan, Miller, & Busch, 2016). Our community project was aimed at taking action against this misunderstood and underappreciated public health issue. We teamed up with two local organizations, Mothers Strong and the Enloe Mother and Baby Care Center, and created a student-based role. We provided support to these organizations through promoting awareness events in the Chico area and preparation/facilitation of informational trainings to local health organizations that serve the perinatal population. The intention is to have Chico State student nurses involved each semester in this community project. Our poster will showcase the problem prevalence both in our community as well as nationally, and how our project contributed to outreach and awareness from a public health perspective.</p>		

ID	Author List	Title
S27	Kylie Taylor, Amanda Kabish, Sean Rynewicz	Willingness to Pay for Deep Eutectic Solvents
<p>Abstract: The goal of this study is to determine the economic feasibility of implementing a deep eutectic solvent (DES) into CSU, Chico chemistry labs. The DES is made out of biodiesel fuel waste obtained from a local commercial brewery and is made into a solvent through a series of chemical processes. DES' have no known health risks and is completely sustainable. The current solvent used has health risks associated skin, eye and flammability hazards. This study uses data obtained from a choice experiment administered to CSU, Chico students who would potentially benefit from the use of a DES. In the survey, students are asked to make a tradeoff between two hypothetical solvents they would rather replace with the DES for varying fees. The hypothetical solvents have different eye, skin and flammability risk levels that will reveal which type of risk students are most averse to. The value the students associate to their safety, or lack of risk, will be determined by using a logit model is used to determine how the students feel about their risk and will later be added to the final value of the DES. The data reveals that as the level of flammability increases, the odds a student will pay to replace it with the DES increases by 2.32, for skin damage the odds increase by 2.63, and for eye damage the odds increase by 2.62.</p>		
S28	Fiona O'Higgins, Lauren Jones	Cesar Chavez Safety Training
<p>Abstract: The purpose of this public health project was to assess high risk taking behaviors among the CSU Chico Greek population during Cesar Chavez weekend, create a targeted educational program, and evaluate its effectiveness. Cesar Chavez Day is a holiday celebrated on the CSU Chico campus, and has often been recognized as a popular holiday weekend for students to go out and engage in high risk taking behaviors. During 2017's Cesar Chavez weekend alone, sixteen CSU students were hospitalized and one student died from drug and alcohol intoxication that may have been prevented. Our program was specifically designed to prepare the Greek community to feel educated and more confident in their ability to intervene in a dangerous, emergent situation. Our public health project focused specifically on the signs and symptoms of drug and alcohol overdose, when one needs to activate the emergency response system, and how and when to perform layperson's CPR. This poster analyzes our educational program which included a pre-survey to analyze what percentage of the population was planning on engaging in high risk activities, an educational powerpoint presentation, and a post survey to receive feedback if our presentation was helpful at any point during Cesar Chavez weekend. The entirety of our results have not yet been calculated, but the goal is to see an increase in students' confidence when encountering an emergency situation, thereby increasing safety and decreasing negative alcohol/drug related incidents.</p>		
S29	Angelica Rodriguez-Arriaga	Silver mineralization in the Silurian Hills- San Bernardino County, CA
<p>Abstract: The Mojave Desert, Southeast of Death Valley National Park, in Southern California has proven to be economically viable. 40 % of California mineral production in the 80's came from San Bernardino County. This work investigates the distribution and emplacement of silver at the Silurian Hills. Acanthite, silver sulfosates, and silver selenides are the main silver bearing minerals with minor sphalerite, galena, and chalcopyrite (Simmons 2005). We present a map of previously unmapped Intrusions, along with structural features and galena and chalcopyrite mineralized zones. We investigate whether the proximity of intrusions to faults has an impact on mineralization and present a possible model for mineralization of silver ore.</p>		
S30	Grant Esparza, Eduardo Gomez, Dylan Gouthro	Sustainability's Influence on the United States GDP
<p>Abstract: Humanity's need for energy has rapidly increased over the past century. In order to sustain our population, we have utilized a variety of resources to generate electricity, the most dominant of them being fossil fuels. Our aim was to determine if there was strong economic argument to be made for renewable resources. By looking at data from the EIA, we were able examine the relationship between a variety of power sources and the United States' GDP. By comparing each source individually and as a group we found that the most influential non-renewable source was motor gas, and the most influential renewable source was hydroelectric power. These two sources are widely used throughout the country and had the greatest effect on the GDP. What we find most interesting however is the performance of each energy within states. We are continuing to build models to determine how each of these energies perform within states in order to gain a more granular understanding of our issue.</p>		

ID	Author List	Title
S31	Jonathan Gurrola, Katelyn Alvarez	LGBTQ+ Healthcare Training and Community Research
<p>Abstract: How does being a visible ally improve healthcare for LGBTQ+ (Lesbian, Gay, Bisexual, Transgender, Queer) individuals? Two graduating nursing students at California State University, Chico hypothesized that those who identify as LGBTQ+ would most likely disclose their LGBTQ+ identity to a healthcare provider if they have a visible LGBTQ+ identifier ("I Am An Ally" Pin, Rainbow Sticker, etc.). Their current research suggests that LGBTQ+ individuals in the Chico community are twice as likely to disclose their sexual identity if their healthcare provider has a visible LGBTQ+ Ally identifier. To increase the visibility of healthcare allies, the students hosted various training workshops that provided education for those affirming inclusive healthcare of LGBTQ+ patients and challenged providers to wear an ally identifier. It is suggested that after attending the training workshops, healthcare providers were more likely to wear an ally identifier.</p>		
S32	Lindsey Dias, Katie Wheat, Sarah Wehan	Girls on the Run
<p>Abstract: Background: Research shows that bullying is an issue faced by school-aged children. For our community project we worked with Girls on the Run to empower 3rd- 5th grade girls to fight against school yard bullying. School-based bullying prevention programs are widely implemented but not always evaluated. Interventions: Our interventions included multiple different lessons through the GOTR coaches handbook. Girls were taught how to respond and act in situations of bullying. Results: By the end of the GOTR program, girls felt empowered to stand up to bullies. The results of a pre-GOTR and post-GOTR survey demonstrated that these girls were found to have an increased level of: competence, confidence, connection, character, and caring. Conclusions: The mission of our Girls on the Run community project, to empower girls and therefore create powerful women, was met.</p>		
S33	Austin Deogaygay, Seth Jordan, Siobhann Pettway, David Zumwalt	Improving Health Literacy Through Early Intervention
<p>Abstract: Improving health literacy is one of the top goals of Healthy People 2030 and research indicates that those with low literacy are 1.5 to 3 times more likely to have poor overall health. Studies show that by fifth grade students are no longer learning to read but are in fact required to read in order to learn. Here in Chico, approximately 58% of our first through fifth graders are behind or below their expected reading levels. We partnered with Reading Pals to reach students in seven of our local schools. We took a three pronged approach to increasing literacy by creating a book drive, volunteer recruitment programs, and raising community awareness. This program helps increase reading levels by 2.3 months for every one month of intervention. This means over 200 local children are one step closer to meeting one of Healthy People 2030 top goals.</p>		
S34	Ellen Storm, Emily Schilling, Emily Parsons	Children's Health and Motivation Program
<p>Abstract: Using data from the Butte County Community Health Assessment and the County Health Statistics, we identified health concerns in our community. Health disparities in this county include fitness levels that are below standard, high instances of mental health disorders, and inadequate access to healthy food options. To combat this problem, we targeted our teaching toward youth in Butte county. We call our program the Children's Health and Motivation Program (CHAMPS). Health promotion topics include: exercise, nutrition, oral hygiene, hand hygiene, and self-esteem building. Many members of the Boys and Girls Club live in families that struggle financially. As evidence shows a strong association between poverty and poor health outcomes, the Boys and Girls Club was an ideal organization to work with. Our goal, as future nurses, was to implement early education to prevent disparities from affecting these children later in life.</p>		

ID	Author List	Title
S35	Mike Gibson, Tony Miller, Juan Flores, Caius Smallhouse	Michelson Interferometer

Abstract: In 1881, Albert. A. Michelson designed and built an interferometer to find the existence of the ether. Since then Michelson interferometers have been used for precise measurements of the wavelength of light, index of refraction of transparent media, etc. One of the greatest achievements made with the Michelson interferometer was in 2015 when scientists measured, for the first time, gravitational waves at the Laser Interferometer Gravitational-wave Observatory (LIGO). These waves were predicted by Albert Einstein in 1916. They are extremely small amplitude 'ripples' in the fabric of space-time. LIGO interferometer's arms are 4 km long. We performed several measurements with a much smaller interferometer in the laser lab. We learned how to (1) calibrate a new, pre-built Michelson interferometer with a He:Ne laser; (2) measure the wavelength of mercury and sodium D-lines; (3) measure the coherence length of white light; and (4) measure the index of refraction of air as a function of pressure. We will present the obtained results at the poster session.
