



RIVERSIDE

Student Engagement

**UNDERGRADUATE
RESEARCH &
CREATIVE ACTIVITY
SYMPOSIUM**

May 10 - 12, 2022

Schedule of Events:

Tuesday - May 10, 2022

Emerging Research

Emerging Research represents research projects that are in progress. The presenters will present their methodology and expected or initial results.

9:30 – 10:15am	Oral & Creative Arts Presentations
11:00 - 12:15pm	Oral & Creative Arts Presentations
2:00 – 3:15pm	Oral & Creative Arts Presentations
3:30 – 4:45pm	Oral & Creative Arts Presentations

Wednesday - May 11, 2022

Completed Research

Completed Research presentations represent projects that are fully completed.

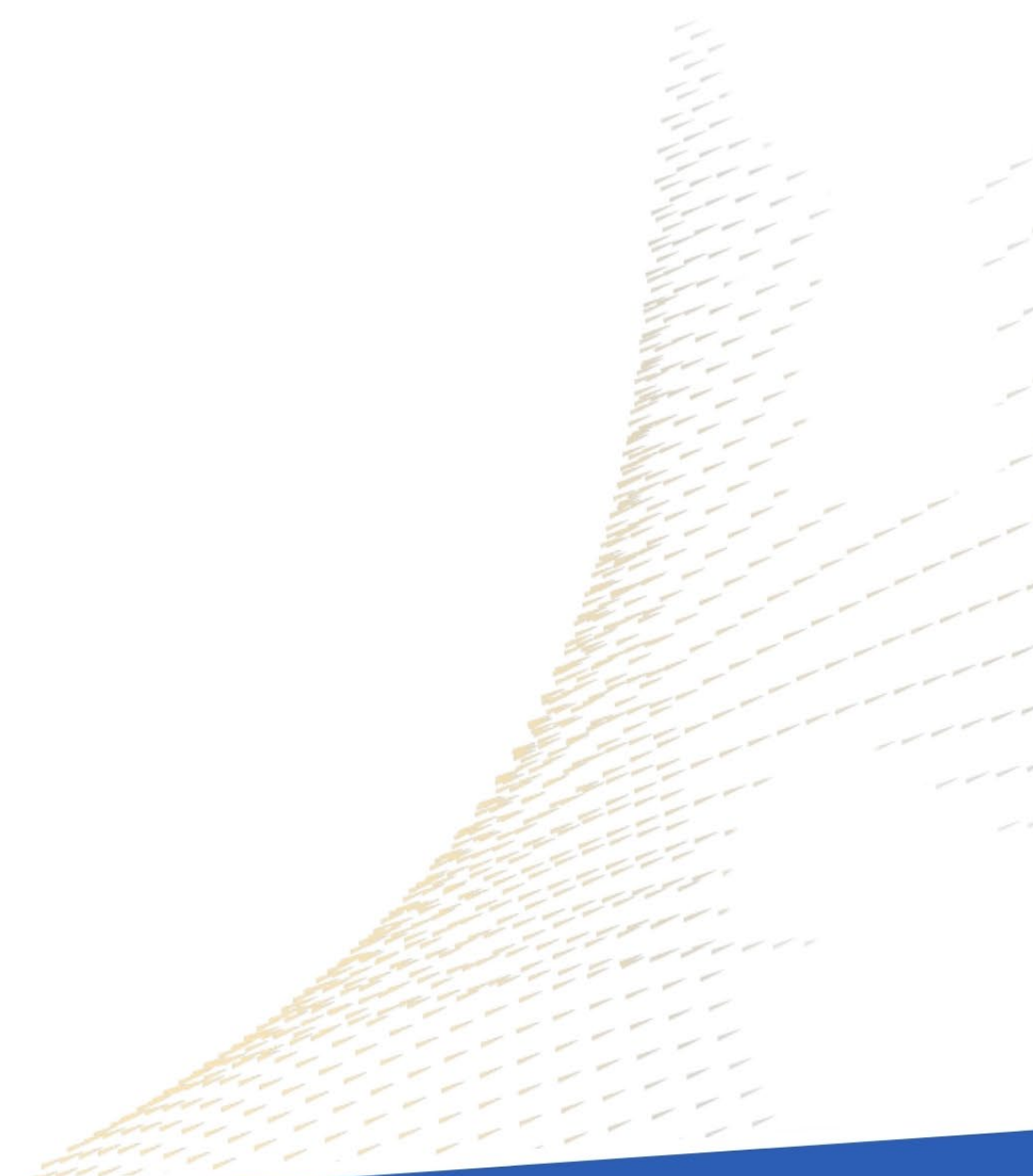
9:00 – 10:15am	Oral Presentations
11:00 - 12:15pm	Oral Presentations
1:00 – 2:15pm	Oral Presentations
2:30 – 3:45pm	Oral Presentations
4:00 - 5:15pm	Oral Presentations

Thursday - May 12, 2022

Poster Presentations

Both poster presentation sessions will be held in-person at the UCR Bell Tower.

11:00 - 12:00pm	Poster Presentations
12:30 - 1:30pm	Poster Presentations



STUDENT PRESENTERS

In order by college:

Marlon and Rosemary Bourns College of Engineering

ETCHI AKO, BIOENGINEERING

FACULTY MENTOR(S): VICTOR RODGERS, BYRON FORD

AN ANALYSIS OF GENES INVOLVED IN NEUREGULIN-1 MEDIATED NEUROPROTECTION IN ISCHEMIC STROKE MODELS

EVERY YEAR, ROUGHLY 750,000 AMERICANS EXPERIENCE A STROKE, WITH ABOUT 87% OF THESE STROKE CASES BEING ISCHEMIC. ISCHEMIC STROKE OCCURS WHEN BLOOD FLOW TO THE BRAIN IS BLOCKED, WHICH CAN LEAD TO SEVERE BRAIN DAMAGE AND NEURONAL DEATH. CURRENT THERAPIES FOR STROKE TREATMENT ARE LIMITED, AND THERE IS A DIRE NEED FOR NEW TREATMENT METHODS. PREVIOUS STUDIES HAVE SHOWN THAT NEUREGULIN-1 (NRG-1) IS A PROMISING TREATMENT FOR ISCHEMIA, DUE TO ITS ABILITY TO SUPPRESS PRO-INFLAMMATORY AND NEURONAL DEATH RESPONSES FOLLOWING STROKE. IN THIS STUDY, OUR GOAL WAS TO ANALYZE THE GENE EXPRESSION OF RATS THAT HAVE UNDERGONE PERMANENT MIDDLE CEREBRAL ARTERY OCCLUSION (PMCAO) AND NRG-1 TREATMENT. RATS WERE TREATED WITH NRG-1, UNDERWENT PMCAO AND WERE SACRIFICED 12 H AFTER INJURY. THE TRANSCRIPTOME ANALYSIS CONSOLE (TAC) AND IPATHWAYGUIDE SOFTWARE WAS USED TO EXAMINE GENE REGULATION AT THE BASELINE, PMCAO, AND NRG-1 TREATMENT CONDITIONS. PRELIMINARY RESULTS SUGGEST THAT HUB GENES PLAY AN IMPORTANT ROLE IN NRG-1 MEDIATED NEUROPROTECTION. FUTURE STUDIES WILL INCLUDE FURTHER GENE NETWORK ANALYSIS.

RADHIKA AMIN, NEUROSCIENCE

PHOEBE TAT, COMPUTER SCIENCE

FACULTY MENTOR(S): AARON SEITZ, RANDY MESTER

VALIDATION OF A VIRTUAL REALITY FLANKER TASK

INHIBITORY CONTROL (IC) AND WORKING MEMORY (WM) ARE BOTH EXECUTIVE FUNCTIONS INVOLVING FRONTAL AND HIPPOCAMPAL REGIONS OF THE BRAIN WHICH BECOME IMPAIRED WHEN RECREATIONALLY USING DRUGS. PREVIOUS RESEARCH HAS DEMONSTRATED A DIRECT INFLUENCE OF RECREATIONAL DRUG USE ON IC AND WM. FOR INSTANCE, CANNABIS USERS TEND TO PERFORM WORSE IN WM TASKS.

WE ADMINISTERED A BATTERY OF IC TASKS AND WM TASKS TO COLLEGE STUDENTS AT THREE SITES (UCR, UCI AND CSUSB; N =343, MAGE = 21.4 YEARS, SD = 5.2 YEARS). FOR IC, WE USED REACTION TIME PERFORMANCE ON THE FLANKER TASK AND WM PERFORMANCE ON THE FORWARD SPAN TASK. FURTHERMORE, A DEMOGRAPHIC QUESTIONNAIRE WAS ADMINISTERED WHICH ASKED PARTICIPANTS ABOUT THEIR RECREATIONAL DRUG USE. IN THE PRESENT ANALYSIS, WE INVESTIGATED HOW PERFORMANCE ON MEASURES OF IC AND WM SINGLY OR JOINTLY EXPLAIN SELF-REPORTED RECREATIONAL DRUG USE. WE HYPOTHEZED THAT WM AND IC SCORES WILL BE PREDICTIVE OF DRUG USE. A MULTIPLE REGRESSION WAS CONDUCTED WITH WM AND IC SCORES TO ANALYZE THEIR PREDICTIVE ABILITY OF DRUG USE. CONTRARY TO OUR HYPOTHESES, OUR RESULTS SUGGEST THAT MEASURES OF WM AND IC ARE NOT PREDICTIVE OF DRUG USE IN ADULTS. WE NOTE THAT WE ARE LOOKING AT SINGLE MEASURES OF IC AND WM IN A GROUP OF PARTICIPANTS THAT MAY NOT EXHIBIT THE FULL RANGE OF DRUG USE BEHAVIORS. ADDITIONAL RESEARCH MAY BE REQUIRED TO BETTER UNDERSTAND WHY WE FAILED TO OBSERVE A RELATIONSHIP BETWEEN IC OR WM AND DRUG USE WHERE PAST STUDIES HAVE FOUND SUCH A RELATIONSHIP.

MARTHA ANGUIANO, CHEMICAL ENGINEERING

FACULTY MENTOR(S): DAVID LO

CHARACTERIZING ULTRAFINE FLUORESCENT BEAD DEPOSITION AND DISTRIBUTION: IMAGEJ ANALYSIS

C57BL/6 MICE WERE EXPOSED TO 1-MICRON FLUORESCENT BEADS TO DETERMINE WHERE ULTRAFINE PARTICLES DEPOSIT IN THE RESPIRATORY SYSTEM. THE USE OF AN AEROSOL CHAMBER ALLOWS FOR CONTINUOUS EXPOSURE OF A CERTAIN PARTICLE SIZE AND CONCENTRATION. AS A RESULT, WE HYPOTHEZIZE THAT THE AEROSOL CHAMBER WILL ACHIEVE A UNIFORM DISTRIBUTION ACROSS THE RESPIRATORY SYSTEM OF THE MICE. INTRANASAL ADMINISTRATION IS WIDELY USED IN THE MEDICAL FIELD WHEN STUDYING DRUG ADMINISTRATION AND EFFECTIVENESS IN TREATING RESPIRATORY DISEASES. SIMILARLY, THIS ADMINISTRATION ROUTE IS ALSO USED IN BIOMEDICAL SCIENCES RESEARCH TO INDUCE INFLAMMATORY CELL RESPONSES TO BETTER UNDERSTAND RESPIRATORY DISEASES. IN LITERATURE, INTRANASAL ADMINISTRATION IS A COMMONLY USED TECHNIQUE DUE TO ITS NON-INVASIVE AND DIRECT DELIVERY OF VARIOUS STIMULI. HOWEVER, THIS METHOD DOES HAVE ITS LIMITATIONS. IN OUR STUDY, THE AEROSOL CHAMBER GROUP WAS EXPOSED TO A BEAD SUSPENSION CONCENTRATION OF $1.71E+09/ML$ CONTINUOUSLY FOR 1 HOUR. THE INTRANASAL GROUP WAS ADMINISTERED A TOTAL OF 40 MICROLITERS OF THE SAME BEAD SUSPENSION CONCENTRATION. THE USE OF AN AEROSOL CHAMBER HAS SHOWN TO BE MORE EFFECTIVE IN ACHIEVING A UNIFORM DISTRIBUTION OF PARTICLES IN THE RESPIRATORY SYSTEM OF THE MOUSE MODELS THAN INTRANASAL ADMINISTRATION. GIVEN OUR HYPOTHESIS OF THE CHAMBER ACHIEVING A UNIFORM DISTRIBUTION, WE HAVE DESIGNED A NEW STUDY TO ADDRESS THE DIFFERENCES IN DISTRIBUTION AND DENSITY OF ULTRAFINE PARTICLES IN THESE METHODS AND HOW IT MAY BE CLINICALLY RELEVANT. IN ORDER TO ADDRESS THIS, WE EXPOSED MICE TO LPS TO IDENTIFY DIFFERENCES IN CELLULAR RECRUITMENT PATTERNS.

HARSHA ANTONY, MECHANICAL ENGINEERING

FACULTY MENTOR(S): P. ALEXANDER GREANEY

ATOMISTIC STUDY OF STRUCTURAL AND ELECTRONIC PROPERTIES OF AMORPHOUS MoO_3 FILMS

TRANSITION METAL OXIDES (TMOs) ARE WIDELY USED IN ELECTRONIC AND OPTICAL APPLICATIONS DUE TO THEIR INTERESTING ELECTRONIC AND OPTICAL PROPERTIES, AND TMOs SUCH AS MoO_3 AND V_2O_5 EXHIBIT CRYSTAL PHASE-DEPENDENT STRUCTURAL AND ELECTRONIC PROPERTIES. IN THIS STUDY, WE ANALYZED THE STRUCTURAL AND ELECTRONIC PROPERTIES OF BULK AND SLAB/FILM STRUCTURES OF BOTH CRYSTALLINE AND AMORPHOUS MoO_3 WITH AND WITHOUT VACANCIES USING A MULTI-TIMESCALE APPROACH. THIS APPROACH COMBINES CLASSICAL MOLECULAR DYNAMICS (MD) SIMULATIONS UTILIZING LAMMPS THROUGH MELT-QUENCH SIMULATIONS AND FIRST-PRINCIPLES DENSITY FUNCTIONAL THEORY (DFT) CALCULATIONS AND ENABLES ONE TO GENERATE MODELS OF AMORPHOUS FILMS WITH LOW-ENERGY SURFACES. PRIOR TO THE AMORPHOUS MODEL DESIGN, WE PERFORMED THICKNESS CALIBRATION OF THE CRYSTAL MoO_3 SYSTEM, AND THE BINDING ENERGY AND WORK FUNCTION ANALYSIS REVEALED THAT THE (010) SLAB, WITH THE THICKNESS OF 3-UNIT CELLS, REPRESENTED A BULK-LIKE CRYSTAL SYSTEM. A SIMPLE INTERATOMIC FORCE FIELD DESIGNED FOR THE CRYSTALLINE SYSTEM WAS ADAPTED TO PRODUCE AMORPHOUS MODELS THROUGH A MELT-QUENCH METHOD USING LAMMPS SIMULATIONS, AND THE RADIAL DISTRIBUTION FUNCTIONS (RDF) FOR THESE MODELS WERE COMPARED TO THE AVAILABLE EXPERIMENTAL DATA TO VERIFY THEIR AMORPHOUS CHARACTERISTICS. OTHER STRUCTURAL PROPERTIES WERE ALSO ANALYZED, SUCH AS THE COORDINATION NUMBERS OF THE ATOMS IN THE MoO_3 FILMS. FURTHERMORE, DIFFERENT CONCENTRATIONS OF OXYGEN VACANCIES WERE INTRODUCED IN THE AMORPHOUS FILMS TO CALCULATE THE VACANCY FORMATION ENERGY FOR OXYGEN IN MoO_3 , AS WELL AS TO STUDY THE EFFECT OF VACANCIES ON ITS STRUCTURAL AND ELECTRONIC PROPERTIES. OUR MULTI-TIMESCALE APPROACH SUCCESSFULLY PREDICTED THE AMORPHOUS MODEL FOR THE MoO_3 SYSTEM USED IN DEVICE APPLICATIONS.

RATNODEEP BANDYOPADHYAY, COMPUTER ENGINEERING

FACULTY MENTOR(S): PHILIP BRISK

HATS: HARDWARE ACCELERATION TOOLSET FOR THE SIGMOID ACTIVATION FUNCTION

THE SIGMOID ACTIVATION FUNCTION IS OFTEN USED IN ARTIFICIAL NEURAL NETWORKS (ANNs), ENABLING THEM TO MODEL NON-LINEAR DATA. THE SIGMOID FUNCTION MAPS THE INPUT TO A REAL NUMBER BETWEEN 0 AND 1 AND IS DEFINED AS,

$$f(x) = \frac{1}{1+e^{-x}}$$

DUE TO THE PRESENCE OF EXPONENTIALS AND DIVISION, HARDWARE ACCELERATING SIGMOID DIRECTLY IS DIFFICULT AND PRODUCES A VERY COMPLEX CIRCUIT, POTENTIALLY THROTTLING HARDWARE ACCELERATED MODELS. TO COMBAT THIS, THE HARDWARE ACCELERATION TOOLSET FOR THE SIGMOID ACTIVATION FUNCTION (OR HATS) PROVIDES A SET OF CUSTOMIZABLE HARDWARE TOOLS THAT IMPROVE THE SPEED OF COMPUTING SIGMOID. HATS BREAKS THIS PROBLEM INTO SEPARATE COMPONENTS: OPERATIONAL COMPLEXITY, NUMERICAL REPRESENTATION, THROUGHPUT, ETC, AND ADDRESSES EACH COMPONENT WITH CONFIGURABLE SOLUTIONS. HATS USES A FIXED-POINT REPRESENTATION WITH USER-CONFIGURABLE PRECISION, WHICH IN CONTRAST TO FLOATING-POINT, IS FAR FASTER, BUT LESS ACCURATE. FOR OPERATIONAL COMPLEXITY, HATS REPLACES THE EXPONENTIAL AND DIVISION OPERATIONS WITH A VARIETY OF FASTER APPROXIMATIONS SUCH AS TAYLOR SERIES, THAT CLOSELY APPROXIMATE THE ORIGINAL SIGMOID. HATS CAN ALSO GENERATE MULTI-CYCLE AND PIPELINE HARDWARE IMPLEMENTATION FOR HIGHER THROUGHPUT. ADDITIONALLY, HATS PROVIDES TOOLS TO ANALYZE AND PLOT THE ERROR GIVEN A SELECTED CONFIGURATION OF PRECISION AND MODEL, ALLOWING THE USER TO TEST AND DETERMINE THE BEST IMPLEMENTATION FOR THEIR NEEDS.

NICHOLAS DELONEY, COMPUTER SCIENCE

FACULTY MENTOR(S): JOSEPH GENEREUX

EVALUATING TMTc+ FOR QUANTITATIVE PROTEOMICS ON A LQT ORBITRAP VELOS PRO

MASS SPECTROMETRY-BASED PROTEOMICS IS AN EXTREMELY USEFUL TOOL FOR CHARACTERIZING PROTEINS. ONE METHOD FOR QUANTIFYING PROTEINS USING MASS SPECTROMETRY IS TANDEM MASS TAGGING (TMT), WHERE PEPTIDES ARE CHEMICALLY LABELED SO THAT A REPORTER ION IS RELEASED DURING PEPTIDE FRAGMENTATION. TMT CAN BE PERFORMED WITH A SINGLE ROUND OF FRAGMENTATION AND IDENTIFICATION (TMT-MS2), BUT SUFFERS FROM LIMITATIONS IN QUANTITATIVE ACCURACY DUE TO INTERFERENCE BETWEEN DIFFERENT PEPTIDES. ALTERNATIVELY, TMTc+ QUANTIFIES TMT-LABELED PROTEINS USING COMPLEMENT REPORTER IONS (SONNETT, YEUNG, AND WÜHR 2018), OFFERING HIGHER REPORTED ACCURACY. HOWEVER, TMTc+ HAS ONLY BEEN PERFORMED ON HIGHER RESOLUTION QUADRUPOLE-ORBITRAPs. OUR GOAL IS TO DETERMINE WHETHER TMTc+ IS EFFECTIVE ON THE LOWER RESOLUTION HYBRID ORBITRAP MASS SPECTROMETERS. IF NOT, WE WOULD LIKE TO OPTIMIZE HOW TMTc+ CAN BE USED ON THESE INSTRUMENTS TO BENCHMARK THE RELIABILITY OF TMT-MS2 DATA FOR SPECIFIC CLASSES OF SAMPLE. TO EVALUATE THE EFFECTIVENESS OF TMTc+, WE RAN TMTc+ ON NEW SAMPLES. SAMPLES CONSISTED OF HUMAN CELL LYSATE IN A 1 TO 4 TO 10 TO 4 TO 1 RATIO ACROSS FIVE TMT CHANNELS, ADDED INTO LABELED E. COLI LYSATES TO INCREASE THE DENSITY OF POTENTIALLY INTERFERING PEPTIDES. WHEN COMPARING THE RATIOS OF TMTc+ TO THAT OF THE REPORTER IONS, WE SEE THAT AT HIGH RESOLUTION TMTc+ HAS SIMILAR QUANTITATIVE ACCURACY TO TMT-MS2, BUT AT LOWER RESOLUTIONS TMTc+ DOES NOT PERFORM AS WELL AS TMT-MS2. ADDITIONALLY, WE EVALUATE THE BASIS FOR POOR TMTc+ PERFORMANCE ON AN LTQ ORBITRAP VELOS PRO.

DANIEL DUDLEY, BIOENGINEERING

FACULTY MENTOR(S): AARON SEITZ

GAZE ESTIMATOR FOR UNITY GAME ENGINE

THE BRAIN GAME CENTER AT THE UNIVERSITY OF CALIFORNIA, RIVERSIDE DEVELOPS BRAIN TRAINING GAMES IN UNITY FOR THE IMPROVEMENT OF MEMORY, VISION, HEARING, ATTENTION, AND COGNITION. OUR SOFTWARE AIMS TO APPROXIMATE USER ENGAGEMENT DURING GAMEPLAY TO ENHANCE TRAINING OUTCOMES. A KEY METRIC OF USER ENGAGEMENT IS DETERMINED BY ESTIMATING WHERE ONE'S GAZE IS DIRECTED WHILE THEY PLAY. GAZE ESTIMATION IS AN APPLICATION OF COMPUTER VISION TECHNOLOGY THAT CAPTURES IMAGES FROM A USER-FACING CAMERA TO PREDICT WHERE ONE IS LOOKING. GAZE ESTIMATOR IS AN IMPLEMENTATION OF GAZE ESTIMATION ALGORITHMS FOR USE IN UNITY. GAZE ESTIMATION DATA COLLECTED BY GAZE ESTIMATOR PROVIDES RESEARCHERS AND DEVELOPERS AT THE UCR BRAIN GAME CENTER WITH AN ACTIONABLE MEANS TO INFORM THEIR GAME DEVELOPMENT STRATEGY. THIS PRESENTATION DETAILS THE DESIGN CONSIDERATIONS AND METHODOLOGIES EMPLOYED IN THE DEVELOPMENT OF OUR GAZE ESTIMATION SOFTWARE.

HEIDI DYE, COMPUTER SCIENCE

FACULTY MENTOR(S): CHRISTIAN SHELTON

DR. DNN

THIS ONGOING RESEARCH SEEKS TO INVESTIGATE HOW DEEP NEURAL NETWORKS (DNN) CLASSIFY INPUT OR MAKE A DIAGNOSIS (CLASSIFICATION) BASED ON AN IMAGE OF A CHEST X-RAY (INPUT). TO ACCOMPLISH THIS, WE SEEK TO UNDERSTAND THE INPUT IMAGE ITSELF AND GAUGE WHETHER A DNN IS MAKING DIAGNOSES FOR THE CORRECT REASONS. TO EFFECTIVELY COMMUNICATE THE "REASON" FOR THE CLASSIFICATION, WE ADJUST THE INPUT IMAGE TO REVERSE THE OUTPUT DIAGNOSIS WITH AS SMALL OF A CHANGE AS POSSIBLE, THUS HIGHLIGHTING THE EXPLANATION AND PRODUCING A COUNTERFACTUAL X-RAY. HOWEVER, IT IS NECESSARY TO KEEP THIS COUNTERFACTUAL X-RAY IMAGE AS A PLAUSIBLE X-RAY TO BE INTERPRETABLE BY A HUMAN AND GAIN THE TRUST NECESSARY TO USE THE TOOL IN PRACTICE. CURRENTLY THIS RESEARCH FOCUSES ON HOW TO CONSTRUCT A FLEXIBLE PARAMETERIZATION OF VALID CHEST X-RAY IMAGES TO BE USED IN SUCH EXPLANATIONS. WE ARE TRAINING A VARIATIONAL AUTOENCODER (VAE) TO IDENTIFY WHAT MANY CHEST X-RAYS HAVE IN COMMON TO LEARN HOW TO GENERATE A FAKE, BUT CONVINCING X-RAY. THIS INVOLVES USING A PUBLICLY AVAILABLE DATASET OF ACTUAL IMAGES OF CHEST X-RAYS WITH EIGHT POSSIBLE MEDICAL DIAGNOSES TO TRAIN WITH. THE VAE ENCODES AND DECODES EACH X-RAY FROM A LATENT SPACE. THIS LATENT SPACE CAN THEN BE SAMPLED AND SEARCHED TO GENERATE THE DESIRED FAKE X-RAY.

THIS RESEARCH EXPLORES EFFECTIVE METHODS FOR TRAINING VAES IN THIS CONTEXT, PARTICULARLY HOW TO BALANCE COMPETING OBJECTIVES OF MATCHING HISTORIC IMAGES AND GENERALIZING WELL, AND HOW TO MAKE EFFICIENT USE OF COMPUTATIONAL RESOURCES TO SPEED UP TRAINING.

KAREN GONZALEZ, COMPUTER ENGINEERING
MICHAEL O'DEA, COMPUTER ENGINEERING
PAMODYA PEIRIS, COMPUTER ENGINEERING
PRISCILA HUANTE MENDEZ, COMPUTER ENGINEERING

FACULTY MENTOR(S): KONSTANTINOS KARYDIS

ROBOTIC ARM MANIPULATOR FOR FRUIT HARVESTING

THE INSPIRATION FOR THIS PRODUCT IS TO DEVELOP A TOMATO PICKING ROBOT THAT CAN IDENTIFY THE RIPE RED TOMATO USING COMPUTER VISION, PICK UP THE TOMATO FROM THE VINE WITH THE ROBOT ARM, AND PLACE IT IN A BOX. FOR FEASIBILITY PURPOSES, THE PROJECT WAS REDUCED TO A MINIMUM VIABLE PRODUCT/PROTOTYPE (MVP) WHERE WE REPLACE THE RED/GREEN TOMATOES BY RED/GREEN BALLS. WE USE A 6-DOF ROBOTIC ARM WITH A PARALLEL MOTION TWO JAW GRIPPER AT THE END-EFFECTOR, INTEL REALSENSE D435I CAMERA, AND BALLS WITH A DIAMETER OF ~ 0.04 M FOR THE PROJECT. OUR APPROACH TO PICK THE RED BALLS IS 1) IDENTIFY THE RED BALL USING OPENCV/NEURAL NETWORK AND GET THEIR CENTERS IN PIXEL COORDINATES, 2) EXTRACT THE X,Y,Z COORDINATES OF THE CENTER USING THE REALSENSE SDK, 3) TRANSFORM THE COORDINATES TO THE CAMERA FRAME, AND 4) CALCULATE THE INVERSE KINEMATICS AND PICK THE RED BALL AND PLACE IT IN A BOX. THE ROBOT PICKS UP THE RED BALL WITHOUT ANY ERRORS WHEN THE BALL IS IN THE - AXIS OF THE CAMERA. WHEN IT IS IN THE + AXIS, THERE IS A $\sim 0.01-0.04$ M ERROR WHEN GRASPING. DUE TO THE NATURE OF THE GRIPPER, THE BALL NEEDS TO BE GRASPED PRECISELY ON THE CENTER. ONE PROCESS IS COMPLETED WITHIN 30 SECONDS.

MATTHEW HUNT, COMPUTER SCIENCE

FACULTY MENTOR(S): CHRISTIAN SHELTON

IMPROVING READABILITY, ORGANIZATION, AND SPEED IN A MACHINE LEARNING CODEBASE TO ESTIMATE REDSHIFT AND DETECT DAMPED LYMAN-ALPHA ABSORBERS IN QUASAR SPECTRA

QUASARS IN SPACE SEND LIGHT ACROSS THE UNIVERSE TO HIT PLACES INCLUDING THE EARTH AND LIGHT UP AND HIT OR SCATTER BASED ON ANYTHING THEY HIT. QUASARS CONTINUOUSLY UNDERGO A REDSHIFT AS THEY TRAVEL, AND THE LIGHT GIVEN OFF COULD BE ABSORBED BY GAS CLOUDS THAT THEY GO THROUGH. SINCE THERE IS A CONSTANT REDSHIFT, THE DIFFERENT LOCATIONS OF ABSORPTIONS IN THESE CLOUDS CAN TELL US HOW FAR AWAY THEY ARE FROM US. IT IS IMPORTANT FOR UNDERSTANDING THE UNIVERSE TO CALCULATE THE REDSHIFT OR THE ENCOUNTER OF ANY DAMPED LYMAN ALPHA ABSORBER (DLA). NOT ONLY THIS, BUT IT IS ALSO MUCH MORE EFFICIENT TO AUTOMATE THE PROCESS THAN TO DO IT BY HAND SUCH AS THE CURRENT METHOD DOES. THE GARNETT ET AL.'S MATLAB CODEBASE CALCULATES THE REDSHIFTS AND DETECTS DLAS USING A MACHINE LEARNING MODEL KNOWN AS A GAUSSIAN PROCESS. IN THIS WORK, WE CONVERT IT TO PYTHON TO MAKE IT MUCH MORE ACCESSIBLE AND VERSATILE TO FUTURE PROGRESS. THIS TRANSLATION INVOLVED MANY CHALLENGES IN FINDING REPLACEMENT LIBRARIES FOR FUNCTIONS AS WELL AS SPEEDING UP THE CODE, SO IT WAS COMPARABLE WITH THE ORIGINAL MATLAB VERSION. MOST OF THE DIFFICULTIES IN THE TRANSLATION WERE FOUND IN SPECIFICALLY LEARNING THE GAUSSIAN PROCESS MODEL AND TESTING EACH QUASAR TO SEE HOW WELL THE MODEL DOES. THE RESULTS OF THE TRANSLATION PROVIDE A COMPARABLY SLOWER BUT MORE ACCESSIBLE VERSION OF THE CODE THAT CAN CALCULATE REDSHIFT AND DETECT DLAS WITHIN A VERY EFFICIENT TIME FRAME.

ANGEL KO, BIOENGINEERING

FACULTY MENTOR(S): JIN NAM

UTILIZING OPTOGENICS TO EXAMINE THE FUNCTIONALITY OF TISSUE-ENGINEERED NERVES WITH A MINIMALLY INVASIVE METHOD

SPINAL CORD INJURIES UNIQUELY CHALLENGE THE QUALITY OF LIFE AS IT DISRUPTS THE BODY'S METHOD OF COMMUNICATION, RESULTING IN LOSS OF SENSING AND MOBILITY. UNLIKE MANY OTHER HUMAN TISSUES, THE SPINAL CORD DOES NOT SPONTANEOUSLY REGENERATE BY ITSELF, AND EFFECTIVE TREATMENTS OF SPINAL CORD INJURIES ARE SCARCELY AVAILABLE. IN THIS REGARD, VARIOUS IN VIVO AND IN VITRO SPINAL CORD INJURY MODELS HAVE BEEN DEVELOPED TO UNDERSTAND THE FUNDAMENTAL PATHOGENESIS AND TO DEVELOP EFFECTIVE TREATMENTS. HOWEVER, THE METHODS OF MEASURING NERVE FUNCTIONALITY IN THESE TISSUE-ENGINEERED NERVE CONSTRUCTS ARE TYPICALLY INVASIVE, FOR EXAMPLE, THE INSERTION OF ELECTRODES INTO THE CONSTRUCTS, CAUSING TISSUE DAMAGES AND RESULTING IN UNUSABLE PRODUCTS AFTER TESTING. THEREFORE, THERE'S AN URGENT NEED TO DEVELOP AN IMPROVED TECHNIQUE TO EXAMINE THE ENGINEERED-NERVE TISSUE FUNCTIONALITY. THIS PROPOSAL DESCRIBES A NOVEL APPROACH OF UTILIZING AN OPTOGENETIC TOOL FOR THE NON-INVASIVE ASSESSMENT OF ENGINEERED-NERVE FUNCTIONALITY BY INCORPORATING A VIRAL VECTOR, THE GENE OF CHANNELRHODOPSIN 2 (CHR2), INTO INDUCED PLURIPOTENT STEM CELLS (IPSCs) AND NEURAL STEM CELLS (NSCs). THESE CELLS ARE PREVIOUSLY UTILIZED FOR NERVE TISSUE MORPHOGENESIS IN OUR LAB (TAI). BY THIS TRANSDUCTION, LIGHT-SENSITIVE CATION CHANNELS CHR2 WILL BE EXPRESSED IN THESE CELLS, ENABLING US TO STIMULATE THE CELLS USING A VISIBLE LIGHT TO EXAMINE THE FUNCTIONALITY DURING THE NEURAL TISSUE DEVELOPMENT (LOW).

PAMODYA PEIRIS, COMPUTER ENGINEERING

FACULTY MENTOR(S): KONSTANTINOS KARYDIS, ELENA KOKKONI

INVESTIGATION OF ROBOTIC ARM TRACKING OF INFANT REACHING ACTIONS

IN THIS EMERGING RESEARCH PROJECT, WE INVESTIGATE THE PERFORMANCE OF ROBOTIC ARM TRACKING OF INFANT REACHING TRAJECTORIES. INFANT REACHING TRAJECTORIES HAVE BEEN DEVELOPED BY THE OVERALL PROJECT'S TEAM IN PAST WORK AND INCLUDES INFANTS OF AGE BETWEEN 5-12 MONTHS PERFORMING REACHING TASKS WHILE IN SUPINE POSITION. IN THIS WORK WE CONSIDER A SUBSET OF THE DATASET, THAT IS 60 REACHES, THAT MEET SPECIFIC CONSTRAINTS ON TOTAL REACHING PATH LENGTH AND THE CAMERA ANGLE. WE USE A 5-DOF ROBOTIC ARM TO TRACK AND IMITATE THESE REACHES; TO MINIMIZE SELF-COLLISIONS, THE ROBOT'S END-EFFECTOR IS PLACED ON THE WRIST OF THE ROBOTIC ARM. WE FIND THAT THE ABILITY OF THE ROBOTIC ARM TO TRACK INFANT REACHING TRAJECTORIES IS DETERMINED BY 1) THE START POSITION OF THE REACH, 2) RESPONSE RATE OF THE ROBOT, 3) MAXIMUM PATH LENGTH OF THE REACH, AND 4) RANGE OF THE DATASET. RESULTS SHOW THAT DEPENDING ON THE SIZE OF THE ROBOT, SOME REACHES IT CAN PERFORM ARE LIMITED, ESPECIALLY AS THEY GET CLOSE TO THE BOUNDARY OF ITS WORKSPACE. FOR REACHES WELL WITH THE ROBOT'S WORKSPACE, SUPERIMPOSED PLOTS BETWEEN INFANT REACHING TRAJECTORIES AND THE END-EFFECTOR POSITION ARE ASSESSED BY BLAND-ALTMAN PLOTS TO COMPARE RESULTS, SHOWING THAT THE ROBOTIC ARM CAN OVERALL IMITATE INFANT REACHES.

MAYUR RYALI, COMPUTER SCIENCE
TYLER PASTOR, COMPUTER SCIENCE

FACULTY MENTOR(S): PAEA LEPENDU

FOOD INDEX SCORE

FOOD QUALITY AND AVAILABILITY MAY BE A KEY SOCIAL DETERMINANT OF ONE'S MEDICAL HEALTH. GIVING A PERSON THE ABILITY TO SEE THE QUALITY AND AVAILABILITY OF FOOD IN THE NEARBY AREA MAY LEAD TO AN INCREASE IN HEALTHIER DECISIONS AND BETTER MEDICAL AI. I WORKED WITH THE FOOD INDEX TEAM AT UCR'S PILABS TO CREATE AN APPLICATION USING PYTHON, PRE-EXISTING DATA-SCRAPING AND DATA-TAGGING TOOLS CREATED BY PILABS, AND THE GOOGLE PLACES API. THE APPLICATION TAKES THE USER'S CURRENT LOCATION OR ALLOWS THEM TO INPUT A CUSTOM LOCATION. UPON INPUTTING THE LOCATION, THE APPLICATION WILL PROVIDE THE LOCATION OF EVERY FOOD SOURCE (RESTAURANT, MARKET, ETC) WITHIN A FIVE-MILE RADIUS. EACH FOOD SOURCE IS THEN ASSIGNED A "FOOD INDEX SCORE" THAT WILL BE AVERAGED TO ASSIGN THE GENERAL AREA A SCORE. THIS SCORE WILL BE DERIVED FROM AN ALGORITHM THAT WILL CONSIDER FACTORS LIKE THE PRICE, DISTANCE, AND FOOD NUTRITIONAL FACTS FOR EACH FOOD SOURCE. WE USED THE OFCOM UNITED KINGDOM NUTRITIONAL PROFILING MODEL TO EVALUATE THE NUTRITIONAL HEALTH OF EACH FOOD SOURCE. THE FOOD INDEX SCORE WILL BE ON A SCALE FROM 1 TO 5 WITH 5 BEING THE BEST ABSOLUTE OPTION AND 1 BEING THE WORST. THIS APP IS A STEP TOWARD IDENTIFYING FOOD SWAMPS. THIS IS IMPORTANT BECAUSE FINDING FOOD SWAMPS HELPS IMPLEMENT PUBLIC POLICY TO REDUCE THE PRESENCE OF FOOD-RELATED DISEASES SUCH AS DIABETES.

SARAH THOMPSON, MECHANICAL ENGINEERING

FACULTY MENTOR(S): MONA ESKANDARI

CHARACTERIZING MORPHOLOGY OF COLLAGEN AND ELASTIN WITHIN THE DISTAL AND PROXIMAL AIRWAYS

PREVIOUS STUDIES CONDUCTED ON SECTIONED PORCINE AIRWAYS CONCLUDED THAT THE SMALLER MORE DISTAL REGIONS OF THE AIRWAYS HAVE AN INCREASED STIFFNESS COMPARED TO THE LARGER PROXIMAL AIRWAYS. THIS FINDING OVERTURNED LONG STANDING ASSUMPTIONS REGARDING AIRWAY BIOMECHANICS. HOWEVER, BIOCHEMICAL ANALYSIS OF COLLAGEN CONCENTRATION THROUGHOUT THE AIRWAYS SHOWED NO SIGNIFICANT DIFFERENCES ($p < 0.05$ THRESHOLD). THEREFORE, THE REASON FOR DECREASED FLEXIBILITY WITHIN THE DISTAL REGIONS IS UNCLEAR. PRELIMINARY HISTOLOGY IMAGES DEMONSTRATED DIFFERENCES IN COLLAGEN AND ELASTIN FIBER SHAPE FROM PROXIMAL TO DISTAL AIRWAYS. THE FIBERS WITHIN THE SMALLER AIRWAYS APPEARED STRAIGHT AND TAUT WHILE THE LARGER AIRWAYS ILLUSTRATED LARGER AMPLITUDE AND DECREASED LENGTH. WE HYPOTHEZIZE THAT THE MICROSTRUCTURAL MORPHOLOGY MAY PROVIDE A POTENTIAL EXPLANATION FOR THE MECHANICAL DIFFERENCES WITHIN THE AIRWAYS. THIS STUDY AIMS TO PROVIDE DATA FOR AN AUTOMATED FIBER WAVINESS QUANTIFICATION ALGORITHM TO MORE ACCURATELY ASSESS DIFFERENCES IN COLLAGEN AND ELASTIN MORPHOLOGY THROUGHOUT THE AIRWAYS. PORCINE TRACHEA, LARGE BRONCHI, AND SMALL BRONCHI WERE SECTIONED TO 10 MICRONS THICK. SECTIONS WERE THEN FLUORESCENTLY STAINED FOR COLLAGEN AND ELASTIN USING IMMUNOHISTOCHEMISTRY. Z-STACK IMAGES WERE THEN TAKEN USING A ZEISS 880 INVERTED CONFOCAL MICROSCOPE. MEASUREMENTS OF WAVINESS AND GLOBAL ANGLE OF FIBER BUNDLES WILL BE PERFORMED USING THE AUTOMATED ALGORITHM. THE MEASUREMENTS WILL THEN BE FIT TO A KNOWN PROBABILITY DENSITY FUNCTION. THE RESULTS FROM THIS STUDY WILL AID IN UNDERSTANDING THE RELATIONSHIP BETWEEN EXTRA-FIBRILLAR MORPHOLOGY AND THE MECHANICAL PROPERTIES OF THE AIRWAYS.

ANABELLE WRIGHT, BIOENGINEERING

FACULTY MENTOR(S): HEIDI WALTZ

DEVELOPMENT OF A SONG-BASED LEVANTINE (LEBANESE-ACCENT) ARABIC TEACHING RESOURCE

DUE TO THE WAR, UNREST, INFLATION, AND SCARCITY THAT HAS BOMBARDED LEBANON OVER THE PAST 45 YEARS, MILLIONS OF LEBANESE PEOPLE AND THEIR DESCENDANTS NOW LIVE IN DIASPORA. AS A RESULT OF THE LACK OF RESOURCES FOR LEARNING THE SPOKEN LEBANESE ARABIC VARIANT, MARRIAGE TO NON-ARABIC SPEAKING INDIVIDUALS, AND EFFORTS TO ASSIMILATE TO AMERICAN CULTURE, THERE HAVE BEEN MANY LEBANESE EMIGRANTS WHO HAVE BEEN UNSUCCESSFUL IN PASSING DOWN THEIR HERITAGE LANGUAGE TO THEIR CHILDREN, RESULTING IN LOSS OF THE LANGUAGE, OSTRACIZATION, AND A DISCONNECT FROM TRADITIONAL KNOWLEDGE USUALLY PASSED DOWN FROM ARABIC-ONLY SPEAKING ELDERS TO THEIR GRANDCHILDREN.

TO ADDRESS THIS, I HAVE DEVELOPED A POWERPOINT-STYLE TEACHING RESOURCE THAT UTILIZES THE VOCABULARY, GRAMMATICAL, AND CULTURAL LESSONS FOUND IN LEBANESE FOLK SONGS, THUS CONTRIBUTING TO THE EXISTING YET SCARCE BODY OF TEACHING RESOURCES FOR HERITAGE LANGUAGE LEARNERS OF LEBANESE ARABIC. SONGS WERE SAMPLED FROM IN AND AROUND THE CAPITAL OF BEIRUT AND TRANSCRIBED USING A NOVEL PHONETICALLY-CONSISTENT TRANSLITERATION METHOD. WORD-FOR-WORD AND THOUGHT-FOR-THOUGHT TRANSLATIONS OF EACH SONG VERSE WAS THEN PROVIDED ALONG WITH HISTORICAL AND CULTURAL COMMENTARY, WHERE APPLICABLE, AND RELEVANT VOCABULARY, SENTENCE STRUCTURE, AND VERB CONJUGATIONS. FINALLY, DISTRIBUTION OF THE RESOURCE WAS PLANNED TO BE THROUGH A FREELY AVAILABLE YOUTUBE VIDEO SERIES AND DISTRIBUTION TO INTERESTED ARABIC PEDAGOGISTS FOR THE WIDEST POSSIBLE IMPACT. IN DOING THIS, I HOPE TO NOT ONLY HAVE PROVIDED A USEFUL RESOURCE FOR LEARNING LEBANESE ARABIC BUT ALSO TO HAVE CREATED A TEMPLATE THAT CAN BE MODELED FOR USE IN TEACHING ANY SPOKEN DIALECT LACKING A STANDARD FORM.

QUEENIE XU, BIOENGINEERING

FACULTY MENTOR(S): HUINAN LIU

CYTOCOMPATIBILITY OF YTTRIA-STABILIZED ZIRCONIA CERAMICS FOR CRANIAL WINDOW APPLICATIONS

TRANSPARENT YTTRIA-STABILIZED ZIRCONIA (YSZ) CERAMICS ARE PROMISING FOR CRANIAL WINDOW APPLICATIONS DUE TO GOOD MECHANICAL AND OPTICAL PROPERTIES, AND EXCELLENT BIOCOMPATIBILITY. IN THIS STUDY, YSZ DISCS WITH DIFFERENT YTTRIA CONCENTRATIONS WERE PREPARED USING COMMERCIAL AND PYROLYSIS-SYNTHESIZED NANOPARTICLES. THE DISCS MADE USING PYROLYSIS-SYNTHESIZED NANOPARTICLES ARE DENOTED WITH _P, WHILE DIFFERENT PERCENTAGE OF YTTRIA CONCENTRATIONS ARE DENOTED BY A NUMBER, WHERE 6YSZ WOULD BE A DISC WITH 6% YTTRIA PREPARED USING COMMERCIAL NANOPARTICLES. WE CHARACTERIZED YSZ DISCS IN MICROSTRUCTURE, SURFACE MORPHOLOGY, AND HYDROPHILICITY. WE EVALUATED THE CYTOCOMPATIBILITY OF YSZ WITH BONE MARROW-DERIVED MESENCHYMAL STEM CELLS (BMSCs) VIA A DIRECT CULTURE METHOD. THE CROSS-SECTIONAL MICROSTRUCTURES SHOWED THAT ALL DISCS EXCEPT 3YSZ HAD POLYCRYSTALLINE GRAINS COMPRISED OF SMALLER CRYSTALLINE DOMAINS WHILE 3YSZ DISCS WERE COMPOSED OF SMALL GRAINS ONLY. BOTH THE UNPOLISHED AND POLISHED DISCS HAD WATER CONTACT ANGLES OF 79.5° - 84.9°. THE CELL STUDY SHOWED THAT BMSCs ON POLISHED DISCS HAD A STATISTICALLY GREATER SPREADING AREA THAN THOSE ON UNPOLISHED DISCS WITH THE SAME COMPOSITION. IN GENERAL, 8YSZ, 4YSZ_P, AND 8YSZ_P DISCS HAD LOWER AVERAGE CELL ADHESION DENSITIES THAN OTHER DISCS WITH DIFFERENT COMPOSITIONS UNDER DIRECT CONTACT CONDITIONS. UNDER INDIRECT CONTACT CONDITIONS, THE GROUPS OF YSZ DISCS, Ti, GLASS, AND CELL-ONLY HAD SIMILAR AVERAGE CELL ADHESION DENSITIES. THERE IS NO MINERAL DEPOSITION DETECTED ON THE POLISHED YSZ DISCS BEFORE AND AFTER CELL CULTURE. THIS STUDY PROVIDED CRITICAL RESULTS FOR THE SCREENING OF TRANSPARENT YSZ CERAMIC DISCS FOR CRANIAL WINDOW APPLICATIONS.

College of Humanities, Arts, and Social Sciences

ANANNA AHAMED, HIST, ANTH, CPAC, ITALIAN

FACULTY MENTOR(S): KYLE KHELLAF BENJAMIN KING

CHILD ABUSE IN GREEK MYTHOLOGY

MY CAPSTONE PROJECT FOCUSES ON THE THEME OF PARENTAL ABUSE PORTRAYED IN GREEK MYTHOLOGY. THROUGH AN ANALYSIS OF GREEK LITERARY AND ARTISTIC SOURCES, I AIM TO SHOW THAT GREEK PARENTAL FIGURES--BOTH MORTALS AND GODS--FAIL TO RECOGNIZE THEIR CHILDREN AS OBJECTS OF LOVE AND AFFECTION. OFTEN THESE PARENT-CHILD RELATIONSHIPS CAN BE VISUALIZED AS AN OPPORTUNITY EITHER TO KEEP THEIR EXISTING POSITION OF POWER OR TO IMPROVE THEIR SOCIAL STATUS.

THE PROJECT BRINGS ATTENTION TO THE QUESTION OF CHILD MALTREATMENT THROUGH THE DETAILED ANALYSIS OF WRITTEN PRIMARY AND SECONDARY SOURCES WHOSE NARRATIVES INCLUDE, TANTALUS FEEDING HIS CHILDREN TO THE GODS, CRONUS EATING HIS OWN CHILDREN, OEDIPUS AND PARIS BEING ABANDONED BY THEIR FATHERS, AND OTHER ACCOUNTS OF PARENTS' ATTEMPTING TO KEEP THEIR POSITIONS OF POWER BY SACRIFICING THEIR OFFSPRING.

AS MYTHOLOGY IS FUNDAMENTAL TO HOW ANCIENT "CIVILIZATIONS" EXPLAIN NATURAL PHENOMENA BEYOND HUMAN UNDERSTANDING, THE PURPOSE AND SIGNIFICANCE OF THIS PROJECT IS TO INTERPRET WHY THE NEGLECT OF ONE'S CHILD IS A RECURRING THEME IN GREEK MYTHOLOGY AND WHY THE PRESENCE OF CHILDREN'S MISTREATMENT WAS IMPORTANT TO ANCIENT GREEK CULTURE. THIS RESEARCH FILLS A CRUCIAL GAP IN CLASSICAL STUDIES BY ILLUSTRATING HOW THE COMPLEX REAL-LIFE PARENT-CHILD RELATIONSHIP EXPERIENCED IN GREEK POLEIS FREQUENTLY ASPIRED TO SUCH THEMATIC MYTHS.

RADHIKA AMIN, BIOLOGY

JASMINE LOPEZ, NEUROSCIENCE

DEEPTI AGARWAL, PSYCHOLOGY

FACULTY MENTOR(S): AARON SEITZ, AUDREY CARRILLO

HOW DOES PERFORMANCE ON MEASURES OF INHIBITORY CONTROL AND WORKING MEMORY SINGLY OR JOINTLY EXPLAIN SELF-REPORTED RECREATIONAL DRUG USE?

THE FLANKER TASK IS A NEUROPSYCHOLOGICAL TEST DESIGNED TO MEASURE INHIBITORY CONTROL – THE ABILITY TO IGNORE AUTOMATIC RESPONSES IN ORDER TO REACH HIGHER GOALS. THE TRADITIONAL, COMPUTER FORM OF THE FLANKER TASK IS VASTLY USED AND WELL CITED. HERE WE SEEK TO DEVELOP A VIRTUAL REALITY (VR) FLANKER GAME. THE ADVANTAGE OF A VR FLANKER GAME IS THAT IT CAN SERVE BOTH AS A FUN METHOD TO ASSESS FLANKER EFFECTS AND AS A TRAINING TOOL. FURTHERMORE, WE PLAN TO EXTEND THE FRAMEWORK TO ADD ADDITIONAL TASKS OF INHIBITORY CONTROL SUCH AS STOPPING AND RULE SWITCHING. WHILE A FEW VR FLANKER TASKS HAVE BEEN VALIDATED, THEY ARE NOT EASILY ACCESSIBLE AND DON'T REQUIRE THE PARTICIPANT TO USE THEIR FULL RANGE OF ARM MOTION. THE AIM OF THE PRESENT STUDY IS TO VALIDATE A VR FLANKER TASK. LONG-TERM USE OF A VALIDATED VR FLANKER TASK COULD ALLOW US TO EMULATE REAL-WORLD SITUATIONS AND LEAD US TO BETTER UNDERSTAND POPULATIONS STRUGGLING WITH INHIBITORY CONTROL. WE WILL BE COMPARING OUR VR FLANKER WITH AN ALREADY VALIDATED COMPUTER FORM OF THE TASK. THE VR AND COMPUTER FORMS OF THE TASK WILL BE ADMINISTERED IN A COUNTERBALANCED MANNER TO A GROUP OF COLLEGE STUDENTS. STANDARD PERFORMANCE MEASURES (I.E. REACTION TIME AND ACCURACY) WILL BE COMPARED ACROSS BOTH TASKS. IN THIS PRESENTATION, WE WILL PRESENT THE VR FLANKER TASK, THE DEVELOPMENTAL PROCESS OF THE VR TASK, AND PRELIMINARY DATA.

KAREN ANGYOUS, PSYCHOLOGY**POOJA KYLASA, PSYCHOLOGY****CHARLES HUANG, PSYCHOLOGY****AMILY TUOT, NEUROSCIENCE**

FACULTY MENTOR(S): LAWRENCE ROSENBLUM

MULTISENSORY TRAINING FACILITATES VOICE LEARNING

WHILE THOSE WITH NORMAL HEARING CAN LEARN TO RECOGNIZE VOICES, INDIVIDUALS WITH HEARING LOSS OR COCHLEAR IMPLANT USERS HAVE DIFFICULTY RECOGNIZING VOICES (CULLINGTON & ZENG, 2011; VONGPHOE & ZENG, 2005). VOICE RECOGNITION IS ACCOMPLISHED BY LISTENING TO THE TALKERS' VOCAL QUALITY SUCH AS BREATHINESS AND FUNDAMENTAL FREQUENCY (E.G., BRICKER & PRUZANSKY, 1976). HOWEVER, TALKERS CAN ALSO BE IDENTIFIED THROUGH THEIR TALKER-SPECIFIC ARTICULATORY STYLE THAT IS AVAILABLE IN THE AUDITORY (REMEZ, 1997) AND VISUAL MODALITIES (ROSENBLUM ET AL., 2007) AS WELL AS ACROSS MODALITIES (SIMMONS ET AL., 2021). MOREOVER, AS SHOWN BY PREVIOUS RESEARCH, VOICES LEARNED WHILE SEEING FACES ARE IDENTIFIED MORE ACCURATELY THAN VOICES LEARNED ALONE (SHEFFERT & OLSON, 2004; VON KRIEGSTEIN ET AL., 2008). NEVERTHELESS, IT IS UNCLEAR WHETHER VOICE FACILITATION IS BASED ON TALKER-SPECIFIC ARTICULATORY STYLE OR NON-ARTICULATORY FACIAL INFORMATION. RESEARCH RECENTLY CONDUCTED IN OUR LABORATORY HAS FOUND THAT VOICES LEARNED WHILE LOOKING AT MOVING OR STATIC FACES (PHOTOGRAPHS OF TALKERS) ARE LATER RECOGNIZED BETTER ON THEIR OWN THAN VOICES LEARNED WITHOUT SEEING THE TALKER. TO TEST FOR THIS MORE DIRECTLY, WE ARE USING A "POINT-LIGHT" STIMULUS TECHNIQUE THAT ISOLATES TALKERS' ARTICULATORY INFORMATION. THE GROUP TRAINED WITH THE POINT-LIGHT FACES WILL THEN BE COMPARED TO THOSE TRAINED AUDITORILY. IF TALKER-SPECIFIC ARTICULATORY INFORMATION FACILITATES VOICE LEARNING, THEN THOSE TRAINED WITH THE POINT-LIGHT METHOD SHOULD OUTPERFORM THOSE TRAINED AUDITORILY.

SARA ARIAN, PSYCHOLOGY

FACULTY MENTOR(S): AARON SEITZ

IMPROVING THE ACCESSIBILITY OF MOTION PERCEPTION TASKS

WEB-BASED EXPERIMENTS HAVE BECOME INCREASINGLY POPULAR OVER THE LAST DECADE. WHILE HISTORICALLY LAB BASED SOFTWARE SYSTEMS, SUCH AS MATLAB, HAVE BEEN FAVORED DUE TO THEIR TECHNICAL SOPHISTICATION AND ABILITY TO PRECISELY CONTROL EXPERIMENTAL PROCEDURES, THEIR REACH HAS BEEN LIMITED. TO ENGAGE IN MORE INCLUSIVE RESEARCH, IT IS OFTEN NECESSARY TO BRING RESEARCH TOOLS TO PARTICIPANTS WHERE THEY LIVE. TOOLS SUCH AS INQUISIT ARE BEGINNING TO FILL THIS GAP, PROVIDING ABILITY TO RUN RESEARCH GRADE EXPERIMENTS ON PARTICIPANTS OWN DEVICES. HOWEVER, TO DATE THERE HAVE BEEN LIMITED TOOLS THAT CAN MEASURE BASIC VISUAL FUNCTIONS SUCH AS MOTION PROCESSING. HERE, WE INTRODUCE A NEW PROCEDURE, USING RANDOM DOT MOTION, THAT WE CO-DEVELOPED WITH INQUISIT THAT AIMS TO MEASURE PEOPLES ABILITY TO DISCRIMINATE MOTION DIRECTION IN NOISE. THIS SOFTWARE IMPLEMENTS SIMILAR PARAMETERS, CONTROLLING SHAPE, COHERENCE LEVELS, SPEED, AND NUMBER OF DOTS AS MATLAB. FURTHER, WE PRESENT DATA TO VALIDATE THE SOFTWARE BY COLLECTING PARAMETRIC MEASURES OF MOTION DIRECTION SENSITIVITY AT DIFFERENT NOISE LEVELS AND DIFFERENT MOTION SPEEDS. OUR DATA SHOW VERY SIMILAR MEASURES BETWEEN THE TRADITIONAL LAB-BASED AND THE NEW WEB-BASED SYSTEMS SUGGESTING THAT THE NEW TOOL IS VALID AND RELIABLE AND POTENTIALLY APPROPRIATE TO COLLECT RESEARCH GRADE DATA IN PARTICIPANTS HOME ENVIRONMENTS.

MARINA BAHAA ZAKHARY GAD EL SAYED, BIOLOGY
WHITNEY TRAN, PSYCHOLOGY
LEXI PUHL, BIOMEDICAL SCIENCES, MARIST COLLEGE

FACULTY MENTOR(S): AARON SEITZ

PARTICIPANT CHARACTERISTICS AFFECTING COMPLIANCE RATE IN A REMOTE COGNITIVE TRAINING STUDY

COGNITIVE TRAINING IS AN EXPANDING BRANCH OF NEUROPSYCHOLOGY THAT INVOLVES REGULAR MENTAL ACTIVITIES AIMED AT MAINTAINING OR IMPROVING ONE'S COGNITIVE ABILITIES, SUCH AS WORKING MEMORY OR ATTENTION. ONLINE RECOLLECT TRAINING (ORT) IS A FULLY REMOTE WORKING MEMORY TRAINING STUDY WITH THE GOAL OF RECRUITING 30,000 PARTICIPANTS. THE PROJECT, HOWEVER, HAS HAD A HIGH ATTRITION RATE, WHICH WE AIMED TO INVESTIGATE BY FOCUSING ON SAMPLE CHARACTERISTICS, SUCH AS PERSONALITY, HEALTH, AND SOCIOECONOMIC STATUS. PARTICIPANTS COMPLETED A SURVEY ABOUT THEIR DEMOGRAPHICS, HEALTH, AND DAILY ACTIVITIES AND THEN TWENTY-TWO SESSIONS OF COGNITIVE ASSESSMENTS AND TRAINING. AVERAGE COMPLETION RATE FOR A SAMPLE OF 2582 PARTICIPANTS THAT JOINED THE STUDY WAS CALCULATED AS 36%. SPEARMAN'S RANK CORRELATION COEFFICIENT TEST SHOWED THAT HIGHER PARENTAL EDUCATION ($\rho = 0.053$, $p < 0.01$), AGE ($\rho = 0.088$, $p < 0.001$), GRIT ($\rho = 0.098$, $p < 0.001$), CONSCIENTIOUSNESS ($\rho = 0.089$, $p < 0.001$), AND EMOTIONAL STABILITY ($\rho = 0.084$, $p < 0.001$) CORRELATED WITH HIGHER COMPLIANCE RATES. THERE WAS NO EVIDENCE TO SUGGEST THAT SELF-REPORTED SOCIOECONOMIC STATUS, AMBITION, AGREEABLENESS, OR EXTRAVERSION SHOWED A STATISTICALLY SIGNIFICANT CORRELATION WITH COMPLIANCE RATE ($p > 0.05$). GIVEN OUR FINDINGS, WE CAN BETTER UNDERSTAND WHO IS MORE LIKELY TO COMPLETE THE WORKING MEMORY TRAINING STUDY, WHICH WE WILL USE IN THE FUTURE TO DETERMINE WHO BENEFITS THE MOST FROM EACH TYPE OF TRAINING. THIS IS RELEVANT, ESPECIALLY WITH THE INCREASE IN ONLINE STUDIES DURING THE COVID-19 PANDEMIC.

ANA BLANCO, LINGUISTICS/SPANISH

FACULTY MENTOR(S): COVADONGA LAMAR PRIETO

METHODOLOGY OF DIGITALIZING FORMER CHANCELLOR TOMAS RIVERA'S LITERARY WORKS.

ONE OF THE GOALS OF SPANISH 130 DIGITAL DIALECTOLOGY IS THE APPRECIATION OF MANUSCRIPTS AND LITERARY WORKS FROM CALIFORNIA WRITERS. THERE IS AN IMMENSE AMOUNT OF INFORMATION TO BE LEARNED FROM MANUSCRIPTS: USE OF THE LANGUAGE AND ITS CHANGES, MIGRATION PATTERNS, DIALECT DIFFERENCES, WRITER'S HISTORY AND STYLE, BILINGUALISM, ETC. DURING FALL 2021, THE CLASS PROJECT MAINLY FOCUSED ON THREE: TO LEARN ABOUT FORMER CHANCELLOR TOMAS RIVERA, TO READ AND STUDY HIS POEMS AND THIRDLY TO BE ABLE TO TRANSCRIBE THEM. TO ACCOMPLISH THIS LAST STEP AN EXPANDED GUIDE WAS CREATED TO ACHIEVE UNIFORMITY THUS PRODUCING A CLEAR AND ORGANIZED FAITHFUL TRANSCRIPTION. AIRTABLE, GOOGLE SLIDES AND OMEKA WERE PIVOTAL IN THE PERFORMANCE OF THIS TASK. OUR FUTURE GOAL IS TO OBTAIN FUNDING SO THAT HIS LEGACY AND TRANSCRIBED LITERARY CAN BE UPLOADED TO THE UNIVERSITY OF CALIFORNIA RIVERSIDE-TOMAS RIVERA LIBRARY WHICH WILL PROVIDE ACCESS NOT ONLY TO UCR BUT TO ANY HIGH SCHOOL, COLLEGE, UNIVERSITY STUDENTS AROUND CALIFORNIA OR ANYWHERE IN THE UNITED STATES.

CAMILLE BROWNING, PSYCHOLOGY

FACULTY MENTOR(S): CECILIA CHEUNG

MOTIVATIONAL FACTORS OF PROFESSIONAL TENNIS STARS

MULTIPLE SOCIAL MOTIVATIONAL FACTORS HAVE AN IMPACT ON CHILD DEVELOPMENT, WHICH MAY HAVE SIGNIFICANT IMPACTS ON THEIR FUTURES IN LIFE. THIS IS PARTICULARLY INTERESTING TO OBSERVE IN THE LIVES OF PROFESSIONAL FEMALE ATHLETES, NAMELY BILLIE JEAN

KING, SERENA WILLIAMS, AND NAOMI OSAKA. THIS PROJECT AIMED TO INVESTIGATE THE DIFFERENT MOTIVATIONAL FACTORS WHICH INFLUENCED EACH ATHLETE'S ABILITY TO FIND SUCCESS IN THEIR PROFESSIONAL CAREERS. THIS STUDY HYPOTHESIZED THAT SIMILAR FACTORS IN THE HOME AND PROFESSIONAL ENVIRONMENTS OF EACH OF THESE ATHLETES CONTRIBUTED TO THEIR DEVELOPMENT AS TENNIS PLAYERS, WHICH IN TURN ALLOWED THEM TO FIND SUCCESS IN THEIR LATER CAREERS. THE STUDY UTILIZED A MIXED METHODS APPROACH, IN THAT QUALITATIVE DATA WERE FIRST RETRIEVED FROM BIOGRAPHICAL NOVELS ABOUT EACH ATHLETE; SUBSEQUENTLY, THEMATIC UNITS IN THE NOVELS WERE CODED AND THE RESULTING QUANTITATIVE DATA WERE STATISTICALLY ANALYZED. THE ANALYTIC APPROACHES INCLUDED CORRELATIONS, ANALYSES OF COVARIANCE, AND REGRESSION. PRELIMINARY RESULTS REVEALED SIGNIFICANT FINDINGS RELATED TO SUPPORT FACTORS (I.E., FAMILY, COACH, PEER, AND RESOURCE) ON OUTCOME VARIABLES (I.E., OUTSPOKEN, RESILIENCY, AND ACCOMPLISHMENTS). THESE FINDINGS ARE IMPORTANT TO DISCUSS BOTH IN THE REALMS OF DEVELOPMENTAL AND SPORTS PSYCHOLOGY BECAUSE IT SHEDS LIGHT ON HOW SOCIAL FACTORS DURING DEVELOPMENT CAN YIELD THE GREATEST AMOUNT OF PERSONAL AND OBJECTIVE SUCCESS LATER IN LIFE.

JWYNETH BUTIU, PHILOSOPHY

FACULTY MENTOR(S): ERIC SCHWITZGEBEL

CONCEPTUALIZING MADNESS

ABLEISM, THE PRACTICE OF DISCRIMINATING AGAINST ANYONE DUE TO DISABILITY, IS GROUNDED IN THE SOCIAL CONSTRUCTION AND PREFERENCE FOR THE CHARACTERIZATION OF "NORMAL" INDIVIDUALS. UNFORTUNATELY, DESPITE ABLEISM'S CURRENT POLITICAL AND SOCIAL ACKNOWLEDGMENT, SOCIETAL REPUDIATION OF DISABLED INDIVIDUALS WITHIN SOCIETY CONTINUES. SIMILAR TO THE EARLY TWENTIETH CENTURY, DISABLED INDIVIDUALS WERE PLACED IN ABUSIVE AND EXPERIMENTAL MENTAL HEALTH INSTITUTIONS TO SEPARATE THEM FROM THE REST OF SOCIETY. WHILE THERE IS A SIGNIFICANT IMPROVEMENT IN SOCIETAL, POLITICAL, AND MEDICAL TREATMENT OF THOSE WITH DISABILITIES, THEY ARE - OFTEN - PLACED IN ADULT RESIDENTIAL FACILITIES SUPPOSEDLY FOR BETTER MEDICAL ATTENTION AND QUALITY CARE. NEVERTHELESS, WITHIN RESIDENTIAL FACILITIES, ABUSIVE BEHAVIOR (VERBALLY, EMOTIONALLY, AND PHYSICALLY) ENACTED BY THE CAREGIVERS COVERTLY PERSISTS.

CONSEQUENTLY, DUE TO THE SOCIETAL OSTRACIZATION OF THOSE WITH DISABILITIES, THEY ARE OFTEN DISMISSED AS "THE OTHER," DIFFERENTIATING THEM FROM THE CURRENT SOCIETAL STANDARDS FOR WHO IS CONSIDERED TO BE A "NORMAL" INDIVIDUAL. IT MAY BE INFERRED THAT FACILITIES WITH CAREGIVERS MISTREATING THEIR PATIENTS REFLECT THE HISTORICAL AND SOCIETAL MALTREATMENT OF DISABLED INDIVIDUALS IN WESTERN CULTURE. IN THIS PAPER, I INTEND TO TRACE AND ANALOGIZE THE HISTORY OF ABLEISM AND CORRELATE THIS SOCIETAL PERCEPTION TO THE THREE CENTRAL THEORIES OF CONVENIENCE, DEHUMANIZATION, AND SADISTIC ATTITUDES APPLIED ON A MACRO AND MICRO SCALE WITHIN THE POPULATION/INDIVIDUAL. BY EXPLORING THE MALTREATMENT AND DISPLACEMENT OF THOSE WITH A COGNITIVE DISABILITY, THERE MAY BE A SOCIETAL EXAMINATION OF HOW WE MAY IMPROVE OUR ATTITUDES AND PERCEPTION TOWARD THOSE WITH COGNITIVE DISABILITIES.

ALAN CASTRO, HISTORY/ETHNIC STUDIES

FACULTY MENTOR(S): PAUL D'ANIERI

AGENTS SEEKING AGENCY

THE CENTRAL INTELLIGENCE AGENCY'S ROLE WITHIN AMERICAN DEMOCRACY IS MISUNDERSTOOD AND IS PRONE TO MISUSE AS A RESULT. THE CIA IS VIEWED AS BEING THE HAMMER OF FOREIGN POLICY AND IS USED AS A LIGHTNING ROD, OR SCAPEGOAT, SHOULD THE OPERATION FAIL OR PROVE TO BE UNPOPULAR. AS A RESULT OF THE CIA BEING USED AS A SCAPEGOAT FOR POLICY FAILURES, THE AGENCY IS SUBJECT TO

BEING MISUNDERSTOOD BY CONGRESSPEOPLE AND MISUSED BY PRESIDENTS.

THIS HAS THE RESULT THAT LESSONS ARE LOST AS A CONSEQUENCE OF SOLELY PLACING BLAME AND THE CONSEQUENCES UPON THE CIA, OBSCURING THE ROLE OF POLICYMAKERS AND ANY LONG TERM LESSON WITH IT. APPLYING THIS FRAMEWORK, THIS RESEARCH ADDRESSES TWO PRIMARY QUESTIONS: 1) TO WHAT DEGREE DO THE EXECUTIVE AND LEGISLATIVE BRANCHES VIEW THE CIA AS A PANACEA TO COMPLEX FOREIGN POLICY MATTERS? 2) HOW CAN THE CIA'S ROLE WITHIN THE AMERICAN SYSTEM BE REIMAGINED?

THE METHODOLOGY OF THIS PAPER DRAWS UPON AN IN DEPTH ANALYSIS OF THE ACADEMIC AND HISTORIOGRAPHIC OUTPUT SURROUNDING THE IRAN-CONTRA SCANDAL, AND ANALYSIS OF THE REAGAN ADMINISTRATION'S RHETORIC, BOTH WHILE ON THE CAMPAIGN TRAIL AND IN OFFICE, TO CONTEXTUALIZE THE ACTIONS OF THE CIA IN NICARAGUA. THROUGH THE APPLICATION OF THE AFOREMENTIONED METHODS, MY RESEARCH SEEKS TO DEVELOP A NEW PERSPECTIVE ON THE CIA AND THE APPLICATION OF COVERT OPERATIONS IN THE GLOBAL SOUTH; EMPHASIZING THE ROLE OF THE EXECUTIVE OFFICE IN DICTATING THE CIA'S LEADERSHIP AND OPERATIONS AND THE NEED FOR ADEQUATE AND COMPETENT CONGRESSIONAL OVERSIGHT.

AZALEA CORRAL, ANTHROPOLOGY & LATIN AMERICAN STUDIES

FACULTY MENTOR(S): JENNIFER HUGHES

DIVERSITY, EQUITY, AND INCLUSION IN HIGHER EDUCATION

MUCH OF THE RESEARCH THAT HAS BEEN DONE ON EDUCATION FROM AN ANTHROPOLOGICAL PERSPECTIVE THUS FAR HAS FOCUSED ON CHILDREN IN THE STAGES OF PRIMARY AND SECONDARY EDUCATION. RECENTLY, THERE HAVE BEEN A FEW MORE STUDIES THAT FOCUS ON THOSE WHO ARE ENROLLED IN HIGHER EDUCATION. ALTHOUGH SOME RESEARCH HAS BEEN DONE ON COLLEGE-AGED STUDENTS, MY PROJECT IS CENTERED ON THE EXPERIENCES OF UNDERREPRESENTED MINORITY STUDENTS WHO ARE ENROLLED IN AN INSTITUTION OF HIGHER EDUCATION. THE GOAL OF THIS PROJECT IS TO GATHER AND ANALYZE DATA ON THE EFFECTS OF HAVING ACCESS TO DIVERSITY, EQUITY, OR INCLUSION CENTERS AND RESOURCES ON OR NEAR COLLEGE CAMPUSES IN SOUTHERN CALIFORNIA.

USING DATA ON GRADUATION AND RETENTION RATES OBTAINED BY VARIOUS COLLEGE CAMPUSES ALONG WITH EXPERIENCES FROM INTERVIEWS WITH UNDERREPRESENTED MINORITY COLLEGE STUDENTS, I WILL TRANSCRIBE THIS INFORMATION ONTO GRAPH REPRESENTATIONS AND INTERACTIVE STORY MAPS USING GEOGRAPHIC INFORMATION SYSTEMS (GIS) MAPPING SOFTWARE IN ORDER TO PRESENT VISUAL EXAMPLES. I WILL THEN ANALYZE THE EXPERIENCES OF THE INDIVIDUALS INTERVIEWED, ALONG WITH THE DATA GATHERED ABOUT GRADUATION AND RETENTION RATES THROUGHOUT VARIOUS COLLEGE CAMPUSES.

ONE OF THE REASONS FOR CREATING THIS PROJECT IS TO BRING AWARENESS TO THE UNIQUE EXPERIENCES AND SUPPORT SYSTEMS OF MANY UNDERREPRESENTED MINORITY STUDENTS IN HIGHER EDUCATION. THIS PROJECT WAS ALSO CREATED TO ANALYZE THE RELATIONSHIPS BETWEEN ON-CAMPUS RESOURCES PROVIDED TO UNDERREPRESENTED MINORITY STUDENTS ON COLLEGE CAMPUSES, AND THE RATES OF GRADUATION AND RETENTION AMONG THESE GROUPS.

ANDREW CRUZ, PSYCHOLOGY

FACULTY MENTOR(S): WESLEY SIMS

WHAT WE HAVE LEARNED FROM COVID-19, A LITERATURE ANALYSIS.

IN 2020, COVID -19 BROUGHT AROUND MASSIVE CHANGES TO NEARLY EVERY ASPECT OF OUR DAILY LIVES. ONE OF THE AREAS MOST IMPACTED BY THIS VIRUS WAS THE EDUCATION FIELD WITH SCHOOLS BEING FORCED INTO LOCKDOWN AND TRANSITIONING ALL LEARNING TO AN ONLINE FORMAT. NOW THAT TIME HAS PASSED, AND SCHOOLS ARE RETURNING TO THE WAY THEY ONCE WERE, WE CAN LOOK BACK AND EXAMINE THE LITERATURE THAT WAS DEVELOPED DURING THIS TIME TO EXAMINE WHAT KINDS OF IMPACT THE PANDEMIC HAD ON THE FIELD

OF ACADEMIA. THIS PAPER AIMS TO ANALYZE THE LITERATURE DEVELOPED BETWEEN 2020-2021 IN REGARDS TO THE IMPACT OF COVID-19 ON EDUCATION. THE TOPICS DISCUSSED IN THIS PAPER ARE THE IMPACTS TO THE EDUCATIONAL STRUCTURES AND ASSESSMENT, STUDENT SUCCESS, MENTAL WELLBEING DURING CONFINEMENT, AND ALSO ADDRESS ISSUES OF ACCESS TO EDUCATION IN A VIRTUAL ENVIRONMENT AND STEPS NEEDED TO BE TAKEN AS WE MOVE INTO THE FUTURE. BY ADDRESSING THESE TOPICS I INTEND TO DISCUSS THE RESEARCHERS' PREDICTIONS OF OUTCOMES IN THE EARLY STAGES OF THE PANDEMIC AND COMPARE THEIR FINDINGS TO THOSE OF NEWER FINDINGS TO SEE HOW THEIR PREDICTIONS HAVE HELD UP IN THE REALITY OF THE PANDEMIC. THE AIM OF THIS PAPER IS TO QUICKLY COMPILE INFORMATION THAT WE HAVE LEARNED FROM THE PANDEMIC AND HOW IT HAS ALTERED THE ENTIRE SYSTEM OF EDUCATION IN SUCH A SHORT AMOUNT OF TIME AND HOW WE SHOULD INTERPRET THE INFORMATION TO CREATE POSITIVE CHANGES FOR STUDENTS AS WE MOVE INTO THE FUTURE.

JOSEPH-NATHANIEL CUENCA, MUSIC

FACULTY MENTOR(S): DANA KAUFMAN

SCHISM: AN OPERATIC EXPLORATION OF MENTAL HEALTH AND WELLNESS

THE STIGMA SURROUNDING MENTAL ILLNESS IS A GLOBALLY PROMINENT AND PERSISTENT DETRIMENT TO THE ADVANCEMENT OF MENTAL HEALTH AWARENESS, ADVOCACY, AND PURSUIT OF THERAPEUTIC SERVICES. THOUGH THE SOURCE OF MENTAL HEALTH STIGMA IS MULTI-FACETED, THE MORE INFLUENTIAL CONTRIBUTOR IS MEDIA AND ART. A DENSE HISTORY OF INACCURATE PORTRAYALS OF PEOPLE LIVING WITH A MENTAL ILLNESS (OR ILLNESSES) CONTINUES TO INVALIDATE THEIR EXPERIENCES, OFTEN RESULTING IN THEIR EXCLUSION FROM SOCIETY, INCREASED EMOTIONAL DISTRESS, AND, MORE ALARMING, SUICIDE. THE INTENTION OF THIS THESIS IS TO CHALLENGE THAT DEVASTATING HISTORY BY MEANS OF AN EXPLORATIVE OPERA. AS MUSIC IS A UNIVERSAL METHOD OF COMMUNICATING EMOTIONAL EXPERIENCES, AND THE OPERATIC FORM IS AN IMMERSIVE METHOD OF STORYTELLING, ACCURATELY PORTRAYING HOW MENTAL ILLNESS AFFECTS PEOPLE VIA THIS MEDIUM CAN POSITIVELY INFLUENCE THE DIALOGUE AROUND WELLNESS IN A NUANCED, HUMAN FASHION, EFFECTIVELY ADVANCING OUR COLLECTIVE AND INDIVIDUAL UNDERSTANDINGS OF MENTAL HEALTH, BRIDGING THE GAP BETWEEN THOSE WHO DO AND DO NOT LIVE WITH MENTAL ILLNESS, REDUCING THE STIGMA, AND ENCOURAGING MENTAL HEALTH ADVOCACY. THIS OPERA, **SCHISM**, DETAILS THE LIVES OF TWO INDIVIDUALS, AUTUMN AND OLIVIA, WHO LIVE WITH DEPRESSION, ANXIETY, AND TRAUMA, AND EXAMINES THEIR JOURNEYS TOWARD WELLNESS. IT IS COMPOSED FOR VOICE AND SOLO PIANO AND WILL PREMIERE IN MAY OF 2022 VIA ZOOM – FOR EASE OF COMMUNITY ACCESSIBILITY – AFTER BEING FILMED AT UCR ARTS. A QUESTION-AND-ANSWER SESSION WILL BE HOSTED WITH THE AUDIENCE IMMEDIATELY POST-PREMIERE TO FURTHER THE CONVERSATION ABOUT MENTAL HEALTH, PROMOTING WELLNESS AND VALIDATING THE EXPERIENCES OF PEOPLE LIVING WITH MENTAL ILLNESS.

KARAN DILAWARI, PSYCHOLOGY

FACULTY MENTOR(S): MEGAN ROBBINS

GOSSIP FREQUENCY ASSOCIATIONS WITH HAPPINESS

ROMANTIC RELATIONSHIP RESEARCH TENDS TO FOCUS ON COUPLE CHEMISTRY OR PERSONALITY COMPATIBILITY, BUT LESS ATTENTION HAS BEEN PAID TO THE CHARACTERISTICS OF VERBAL PARTNER INTERACTIONS. THIS STUDY SEEKS TO DETERMINE WHETHER GOSSIPING WITH ONE'S ROMANTIC PARTNER IS CORRELATED WITH SUBJECTIVE HAPPINESS. ELECTRONICALLY ACTIVATED RECORDER (EAR) DATA WAS GATHERED FROM 27 SAME-AND DIFFERENT-GENDER COUPLES (N=54). THE EAR IS A DEVICE THAT RECORDS LIVE SOUND FROM A PARTICIPANT'S IMMEDIATE ENVIRONMENT AT PREPROGRAMMED TIME INTERVALS. THESE AUDIO FILES WERE THEN CODED FOR FREQUENCY OF GOSSIP. BOTH PARTNERS COMPLETED THE 4-ITEM SUBJECTIVE HAPPINESS SCALE AT TWO TIME POINTS AND THESE SCORES WERE AVERAGED TO CREATE A COMPOSITE HAPPINESS INDEX. BIVARIATE CORRELATION WAS USED TO DETERMINE THE ASSOCIATION BETWEEN ROMANTIC PARTNER GOSSIP FREQUENCY AND SUBJECTIVE HAPPINESS SCORES. THE DATA SHOWED A CORRELATION OF $r = .216$, INDICATING A SMALL POSITIVE CORRELATION BETWEEN GOSSIP FREQUENCY AND HAPPINESS. COUPLES WHO GOSSIPED MORE FREQUENTLY WITH THEIR SIGNIFICANT

OTHER TENDED TO REPORT HIGHER SUBJECTIVE HAPPINESS, ILLUSTRATING THE POSSIBLE RELEVANCE OF GOSSIP TOWARDS WELL-BEING. THE LIMITATIONS OF THIS STUDY RELATE TO OTHER FACTORS SUCH AS RACE WHICH CAN PLAY A ROLE TOWARDS HAPPINESS AND GOSSIP FREQUENCY. ADDITIONAL LIMITATIONS INCLUDE THE SMALL SAMPLE SIZE AND THE FACT THAT THE CURRENT STUDY'S ANALYSES DID NOT ACCOUNT FOR THE DYADIC NATURE OF THIS DATA, (I.E., THE FACT THAT PARTNER'S DATA ARE INHERENTLY LINKED). FUTURE RESEARCH CAN UTILIZE INFO ABOUT RACE OR COUPLE ORIENTATION TO DISTINGUISH SPECIFICS ABOUT CERTAIN COUPLES OR RACIAL INFO IN TERMS OF CORRELATION.

YADIRA DOCKSTADER, STUDIO ART

FACULTY MENTOR(S): ANNA BETBEZE

INTERNAL /EXTERNAL LIVING WITH CHRONIC ILLNESS, PAIN AND HIDDEN DISABILITIES THROUGHOUT THE COVID-19 PANDEMIC YEARS 2019-2022

INTERNAL /EXTERNAL IS A COLLECTION OF WORKS EMBODYING RESEARCH RELATED TO THE COVID-19 PANDEMIC (2019-2022), THAT DISCUSSES PERSPECTIVES OF LIVING WITH CHRONIC ILLNESS, PAIN AND HIDDEN DISABILITIES RELATED TO AUTOIMMUNE DISEASE ONSET. THE WORKS ARE A DIARISTIC PERSPECTIVE REGARDING CHALLENGES OF AUTOIMMUNE DISEASE AND SOCIAL APPREHENSIONS RELATED TO HIDDEN DISABILITIES, CONDITIONS OF A BODY IN PAIN AND ILLNESS. THE INCLUSION OF RESEARCH AND DATA REGARDING THE SOCIO-ECONOMIC RELATIONSHIPS OF LABOR AND ILLNESS, HEALTHCARE INEQUALITIES, EXACERBATED MENTAL HEALTH CONDITIONS WITHIN PEOPLE OF COLOR SUFFERING FROM CHRONIC ILLNESS. IN CONTEXT OF THE COVID-19 PANDEMIC THIS WORK EXAMINES THE COLLECTIVE ELEVATED AWARENESS OF ILLNESS AND DEATH AND ITS GLOBAL EXPERIENCE OF DIVIDED PERSPECTIVES IN HOW WE SEE OUR BODIES, AGENCY AND THEIR IMPERMANENCE. THIS RESEARCH AND BODY OF WORK HOPES TO SERVE AS A CONDUIT OPENING UP DIALOGUES RELATED TO CULTURES' INFLUENCE ON HEALTH, HOW ILLNESS AND PAIN ARE EXPERIENCED AND EXPRESSED, AND HOW MYTH AND FALSE INFORMATION AFFECTED AUTOIMMUNE COMMUNITIES DURING THE COVID-19 PANDEMIC. THE CULMINATING EXHIBITION INTERNAL/ EXTERNAL COMBINES THIS LITERARY AND VISUAL RESEARCH TO CREATE A CATALYST FOR EQUALITY BY EXPOSING THE RHETORIC OF ABLEISM AND ASSIST BY BRINGING TOGETHER STORIES OF AUTOIMMUNE DISEASE RESILIENCE BECAUSE SOLACE IS FOUND IN A SHARED EXPERIENCE.

LYNN DOMOND, PSYCHOLOGY

FACULTY MENTOR(S): ALLISON HEDGECOKE

THE PARADOXICAL COMPLEXITIES OF LIFE

FOR MY HONORS CAPSTONE, I WILL BE WRITING A COLLECTION OF 16 POEMS AS A CREATIVE ACTIVITY. MY SUBJECT WILL BE CENTERED AROUND EMOTION, MENTAL ILLNESS, AND THE ASPECTS OF LIFE THAT CONTRIBUTE OVERALL TO LIFELONG HAPPINESS. THESE POEMS WILL BE WRITTEN TO HOPEFULLY INSPIRE OTHERS AND HELP INDIVIDUALS UNDERSTAND THAT THE COMPLEX THINGS THEY'RE FEELING ARE OKAY, AND THAT THEY ARE NOT ALONE. MENTAL ILLNESS IS SUCH A COMPLEX SUBJECT, AND MANY PEOPLE FACE THE GRIPPING EFFECTS OF A PLETHORA OF DIFFERENT ISSUES. BUT CREATIVE MEDIUMS OF EXPRESSION ARE A GREAT WAY TO CONVEY THESE COMPLEXITIES AND ANALYZE THEM FURTHER IN A BEAUTIFUL WAY. MY GOAL IS TO INCORPORATE THESE PERSPECTIVES INTO ONE COHESIVE COLLECTION OF WRITING.

YURITZA ESCALANTE, PSYCHOLOGY

FACULTY MENTOR(S): MISAKI NATSUAKI

EVALUATING THE EFFECT OF MINDFULNESS PRACTICES MODERATED BY OPENNESS ON LONELINESS IN COLLEGE STUDENTS

COLLEGE STUDENTS ARE VULNERABLE TO FEELINGS OF LONELINESS AS THEY NAVIGATE THE CHALLENGES OF COLLEGE LIFE. LONELINESS IS COMMONLY COUPLED WITH OTHER PSYCHOPATHOLOGICAL AND PHYSIOLOGICAL OUTCOMES, SUCH AS DEPRESSION, LOW COGNITIVE PERFORMANCE, AND CARDIOVASCULAR HEALTH RISKS. ONE POTENTIAL MITIGATOR OF LONELINESS IS MINDFULNESS. MINDFULNESS IS DEFINED AS THE OBSERVATION OF ONE'S MOMENT-TO-MOMENT EXPERIENCE IN A NON-JUDGEMENTAL, ACCEPTING MANNER AND IS A CORRELATE OF LIFE SATISFACTION AND SELF-ESTEEM. PREVIOUS STUDIES SHOW THAT INTERVENTION PROGRAMS THAT AIM TO FOSTER MINDFULNESS ARE EFFECTIVE IN DECREASING CHRONIC PAIN, DEPRESSION, AND BORDERLINE PERSONALITY DISORDER. HOWEVER, THESE PROGRAMS REQUIRE A LARGE TIME COMMITMENT AND ARE WORK-INTENSIVE, WHICH IS NOT SUITED FOR COLLEGE STUDENTS' BUSY SCHEDULES, AND ITS EFFECT ON LONELINESS IS UNKNOWN. . THE GOAL OF THIS STUDY IS TO EXAMINE THE IMPACT OF A BRIEF MINDFULNESS INTERVENTION ON LONELINESS AMONG COLLEGE STUDENTS.

USING A PRETEST-POSTTEST EXPERIMENTAL DESIGN, 86 COLLEGE STUDENTS PARTICIPATED IN A 5-MINUTE, DAILY PROGRAM THROUGHOUT THE COURSE OF A WEEK. PARTICIPANTS WERE RANDOMLY ASSIGNED TO TWO GROUPS (INTERVENTION VS. CONTROL). AT THE START OF THE WEEK, AN INITIAL MEASUREMENT OF LONELINESS WAS TAKEN FROM ALL PARTICIPANTS. ON THE FOLLOWING DAYS, THE INTERVENTION GROUP ENGAGED IN DAILY MINDFULNESS TASKS, WHILE THE CONTROL GROUP COMPLETED FIVE DAILY MOOD CHECK-INS. AT THE END OF THE WEEK, LONELINESS LEVELS WERE RE-EXAMINED. THE INDIVIDUALS IN THE INTERVENTION GROUP, ESPECIALLY THOSE WHOSE PERSONALITY IS CHARACTERIZED BY HIGH LEVELS OF OPENNESS TO EXPERIENCE, ARE EXPECTED TO EXPERIENCE MORE OF A DECREASE IN LONELINESS THAN THOSE IN THE CONTROL GROUP.

JUELLE FORD, PSYCHOLOGY

FACULTY MENTOR(S): JOHN FRANCHAK

THE EFFECT OF SIBLINGS ON PARENTAL CHOICES FOR INFANT RESTRAINT

THE DAILY EXPERIENCES OF INFANTS ARE LARGELY GUIDED BY THEIR PARENTS' CHOICES IN CHANGING THEIR PHYSICAL AND SOCIAL ENVIRONMENT. HOWEVER, MORE RESEARCH IS NEEDED ON HOW SOCIAL FACTORS, SUCH AS FAMILY SIZE, AFFECT THESE PARENTING BEHAVIORS. PREVIOUS LITERATURE HAS FOUND THAT PARENTS WITH MORE THAN ONE CHILD USE RESTRAINT DEVICES (E.G., BABY WALKERS, JUMPERS) FOR CONVENIENCE TO PERFORM OTHER TASKS. CURRENT RESEARCH DOES NOT CONSIDER HOW PARENTAL DECISIONS TO USE THESE RESTRAINT DEVICES MAY CONSTRAIN THEIR INFANTS' OPPORTUNITIES FOR EXPLORATION AND SOCIAL INTERACTION.

THE CURRENT STUDY COLLECTED DATA ON INFANT RESTRAINT FROM 43 PARENT-INFANT DYADS AS THE INFANTS AGED FROM 10 TO 13 MONTHS OLD. PARENTS SELECTED FOUR DAYS EACH MONTH TO RESPOND TO TEXT MESSAGE SURVEYS AT MULTIPLE POINTS THROUGHOUT THE DAY TO REPORT ON THEIR INFANTS' BEHAVIOR. FOR EACH SURVEY RESPONSE, PARENTS REPORTED THE DIFFERENT KINDS OF RESTRAINT INFANTS WERE PLACED IN, LIKE HIGHCHAIRS OR BABY CARRIERS. THIS DENSE SAMPLING ALLOWED FOR ESTIMATING THE PROPORTION OF TIME INFANTS SPENT IN TWO TYPES OF RESTRAINT: BY CAREGIVERS (E.G. HELD, BABY CARRIERS) AND BY INFANT FURNITURE (E.G. WALKERS, HIGHCHAIRS). PRELIMINARY FINDINGS INDICATE THAT INFANTS WITH SIBLINGS ARE MORE OFTEN RESTRAINED BY CAREGIVERS, $t(40) = 2.88$, $p = .046$. HOWEVER, THIS EFFECT IS NOT OBSERVED FOR RESTRAINT BY FURNITURE. MULTIPLE CHILDREN IN THE HOME MAY MODERATE PARENTAL BEHAVIOR TOWARDS THEIR INFANTS AND THE DECISIONS TO RESTRAIN THEM. DIFFERENT KINDS OF RESTRAINT CREATE DIFFERENT OPPORTUNITIES FOR INTERACTION WITH PEOPLE, LANGUAGE, AND OBJECTS WHICH ALTER INFANTS' DAILY EXPERIENCES.

ISABEL FRYETT, SOCIOLOGY

FACULTY MENTOR(S): AMY KROSKA

EXAMINING THE EFFECTS OF SCREEN VIOLENCE EXPOSURE ON BENEVOLENT AND HOSTILE SEXISM

STUDIES SUGGEST THAT EXPOSURE TO SEXUAL VIOLENCE AGAINST WOMEN INCREASES MALE ACCEPTANCE OF VIOLENCE AGAINST WOMEN. YET, IT IS NOT CLEAR IF EXPOSURE TO NONSEXUAL VIOLENCE AGAINST WOMEN AND VIOLENCE MORE GENERALLY AFFECT ATTITUDES TOWARD WOMEN; THEREFORE, I EXPLORE THOSE QUESTIONS. I EXAMINE THE WAY THAT SAME-GENDERED VIOLENCE AND MIXED-GENDER VIOLENCE AFFECT BOTH BENEVOLENT AND HOSTILE SEXISM, AS MEASURED WITH THE AMBIVALENT ATTITUDES ABOUT WOMEN SCALE (GLICK AND FISKE, 1996). I ALSO EXAMINE THE ROLE OF HISTORY OF SCREEN EXPOSURE, AS MEASURED WITH THE EXPOSURE TO MEDIA VIOLENCE SCALE (MRUG ET AL., 2014). USING AN ONLINE EXPERIMENT, 270 PARTICIPANTS WERE RANDOMLY ASSIGNED TO ONE OF SIX CONDITIONS: EXPOSURE TO MALE-ON-MALE VIOLENCE, FEMALE-ON-FEMALE VIOLENCE, MALE-ON-FEMALE VIOLENCE, FEMALE-ON-MALE VIOLENCE, NON-GENDERED VIOLENCE, AND NO VIOLENCE. CONTRARY TO PREDICTIONS, EXPOSURE TO IMAGES WITH FEMALES AS VICTIMS OF VIOLENCE DID NOT INCREASE BENEVOLENT OR HOSTILE SEXISM; INSTEAD, EXPOSURE TO MALE-ON-MALE VIOLENCE DECREASED BENEVOLENT SEXISM. CONSISTENT WITH PREDICTIONS, A HISTORY OF EXPOSURE TO VIOLENT MEDIA WAS ASSOCIATED WITH HIGHER BENEVOLENT SEXISM AND HOSTILE SEXISM. BUT, CONTRARY TO THE PREDICTIONS, THAT HISTORY DID NOT MODERATE THE EFFECT OF A SINGLE EXPOSURE TO VIOLENCE ON EITHER TYPE OF SEXISM. I DISCUSS THE THEORETICAL, EMPIRICAL, AND POLICY IMPLICATIONS OF THESE RESULTS AND CONSIDER AVENUES FOR FUTURE RESEARCH.

MAYA GLASBERG-KELLER, POLITICAL SCIENCE/ADMINISTRATIVE STUDIES

FACULTY MENTOR(S): JOHN BRIGGS

COPING AND HUMAN CONNECTION: THE PERSPECTIVE OF AN ANTHROPOLOGIST FROM MARS

THE POINT OF MY PROJECT HAS BEEN TO EXAMINE—FROM MY OWN PERSPECTIVE AS AN AUTISTIC INDIVIDUAL, AS WELL AS WITH THE CONTEXT OF PREEXISTING LITERATURE ON THE SUBJECT—HOW HUMAN BEINGS COPE WITH THE WORLD AROUND US, WITH OURSELVES, AND WITH EACH OTHER. IN PARTICULAR, MY FOCUS HAS BEEN THE HUMAN URGE TO COPE WITH REALITY BY ATTEMPTING TO FORGE CONNECTIONS WITH OTHERS, BECAUSE—AS SOCIAL CREATURES—THIS INSTINCT IS CORE TO HOW WE GO ABOUT LIVING AND TO HOW WE ORGANIZE OURSELVES INTO CIVILIZATIONS. FOR THE SAKE OF DEMONSTRATING MY OBSERVATIONS ABOUT PEOPLE AND OUR SOCIAL COPING MECHANISMS AS SUCCINCTLY AND CLEARLY AS POSSIBLE, I HAVE DECIDED TO GO ABOUT MY ENDEAVOR BY WRITING A SERIES OF INTERCONNECTED FLASH FICTION SHORTS DEPICTING CRYSTALIZED MOMENTS IN THE LIVES OF ALL SORTS OF PEOPLE DEALING WITH ALL SORTS OF SITUATIONS, AND BY INCLUDING COMMENTARY ON EACH SHORT. ASPECTS OF OUR SOCIAL COPING MECHANISMS THAT I HAVE CHOSEN TO EXAMINE AND DEPICT INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING: THE HUMAN ABILITY TO NORMALIZE OR “OTHER” CONCEPTS ARBITRARILY BASED ON THEIR PRESENCE WITHIN OUR OWN LIVES, THE CONSEQUENCES OF HOW YOUNG CHILDREN’S CONCERNS ARE OFTEN DISMISSED BY ADULTS, AND HOW PEOPLE MOLD (OR FAIL TO MOLD) THEIR BEHAVIOR TO SUCCEED IN PREEXISTING SOCIAL STRUCTURES.

MAYRA GOMEZ-LABRADA, THEATER, FILM, AND DIGITAL PRODUCTION & EDUCATION

FACULTY MENTOR(S): ERITH JAFFE-BERG

ACHIEVEMENT GAPS AND ACCESS TO PERFORMING ARTS PROGRAMS IN CENTRAL VALLEY HIGH SCHOOLS

THOUGH SEVERAL STUDIES HAVE BEEN DONE ON THE OVERALL BENEFITS OF PERFORMING ARTS, CALIFORNIA’S CENTRAL VALLEY HAS BEEN

HISTORICALLY UNDERSTUDIED. THIS PROJECT WILL CENTER AROUND THE RESEARCH QUESTION, "HOW ARE ACHIEVEMENT GAPS CONNECTED TO ACCESS TO PERFORMING ARTS PROGRAMS IN CENTRAL VALLEY HIGH SCHOOLS?" THE GOAL OF THIS RESEARCH IS TO EXAMINE HOW ACCESSIBILITY TO PERFORMING ARTS AFFECTS ACHIEVEMENT AMONG HIGH SCHOOL STUDENTS. THIS STUDY WILL INCLUDE INTERVIEWS AND PHOTOGRAPHS OF MODESTO UNIFIED SCHOOL DISTRICT (MUSD) HIGH SCHOOLS FOUND IN STANISLAUS COUNTY, WHERE ECONOMIC DISPARITY IS PREVALENT.

UPON IRB APPROVAL, PRIMARY, QUALITATIVE DATA WILL BE COLLECTED BY CONDUCTING INTERVIEWS WITH MEMBERS OF THE MODESTO UNIFIED SCHOOL DISTRICT (MUSD). THE POOL OF INTERVIEWEES WILL INCLUDE PERFORMING ARTS TEACHERS, STUDENTS, AND SCHOOL ADMINISTRATORS OF THREE HIGH SCHOOLS IN THE MUSD, PROVIDING A RANGE OF WEALTH DISPARITIES. IN ADDITION, DIGITAL IMAGES OF THE SCHOOLS' PERFORMING ARTS SPACES WILL BE INCLUDED TO DEMONSTRATE THE DIFFERENCES AMONG PROGRAMS FURTHER. THE IMPORTANCE OF ACCESSIBILITY AND THE POWERFULNESS OF ARTS EDUCATION WILL BE THE FOCUS OF THIS RESEARCH. DESPITE PERFORMING ARTS CONTRIBUTING SEVERAL BENEFITS TO STUDENTS, INCLUDING HIGHER SAT SCORES, THE ACCESSIBILITY TO THESE PROGRAMS IS OFTEN LIMITED IN LOW-INCOME SCHOOLS. RESEARCHING THE CONNECTIONS BETWEEN PERFORMING ARTS AND ACHIEVEMENT WILL SHED LIGHT ON THE IMPORTANCE OF THE ARTS, FOSTER MORE EQUITY, AND FIGHT FOR ACCESS TO THESE PROGRAMS IN ALL SCHOOLS.

NANCY GONZALEZ-VILLATORO, PSYCHOLOGY

FACULTY MENTOR(S): RACHEL WU

INVESTIGATING THE EFFECTS OF MICROAGGRESSIONS ON CAREER ASPIRATIONS AND LEARNING COMPETENCES AMONG LATINX UNDERGRADUATES

RACIAL AND ETHNIC MICROAGGRESSIONS ARE KNOWN AS SEEMINGLY MINOR DAILY OCCURRENCES (WHETHER VERBAL, BEHAVIORAL, OR ENVIRONMENTAL) THAT DISRESPECT EITHER INTENTIONALLY OR UNINTENTIONALLY, AND ARE HOSTILE AND DEROGATORY TOWARDS PEOPLE OF COLOR. PREVIOUS RESEARCH ON THE IMPACT OF MICROAGGRESSIONS ON LATINX INDIVIDUALS HAVE FOCUSED ON MENTAL HEALTH, COPING STRATEGIES, AND ACADEMIC OUTCOMES BUT VERY LITTLE WORK HAS BEEN CONDUCTED EXAMINING THE IMPACT OF MICROAGGRESSIONS ON CAREER ASPIRATIONS AND PERCEIVED LEARNING COMPETENCE. THUS, THIS STUDY AIMS TO EXAMINE THE EFFECTS OF ETHNIC/RACIAL MICROAGGRESSIONS ON THE CAREER ASPIRATIONS AND PERCEIVED LEARNING COMPETENCE OF LATINX COLLEGE STUDENTS. THE STUDY SAMPLE WILL CONSIST OF APPROXIMATELY 30 LATINX UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF CALIFORNIA RIVERSIDE. REGRESSION ANALYSES WILL BE CONDUCTED USING THE PARTICIPANT'S AGGREGATED SCORES FROM THE RACIAL ETHNIC MICROAGGRESSIONS SCALE (REMS), THE CAREER ASPIRATIONS SCALE (CAS), AND THE PERCEPTIONS OF COMPETENCE FOR LEARNING SCALE. WE HYPOTHESIZE THAT HIGHER LEVELS OF MICROAGGRESSION INSTANCES WILL SIGNIFICANTLY PREDICT LOWER LEVELS OF CAREER ASPIRATIONS AND PERCEIVED LEARNING COMPETENCE. THE FINDINGS FROM THIS STUDY WILL FURTHER CONTRIBUTE TO THE GROWING BODY OF RESEARCH ON MICROAGGRESSION IMPLICATIONS AMONG ETHNIC MINORITIES.

KARLA HERNANDEZ, SPANISH

FACULTY MENTOR(S): ALESSANDRO FORNAZZARI

TRANSBORDER REALITIES: ITS EFFECT ON BORDERTOWN STUDENTS PURSUING A HIGHER EDUCATION

IN THIS RESEARCH WE WILL DIVE INTO THE TESTIMONIES OF FIVE BORDER TOWN STUDENTS WHO LIVE ON THE U.S.-MEXICO BORDER EITHER IN CALEXICO, CALIFORNIA, OR MEXICALI, BAJA CALIFORNIA, MEXICO. THE STUDY USES TESTIMONIALS TO HELP US UNDERSTAND THE FLAWS WITHIN THE EDUCATIONAL SITE OF CALEXICO HIGH SCHOOL AS WELL AS FLAWS OF THE REGIONAL SCHOOL DISTRICT AND THE LIMITATIONS IT IMPOSES ON BORDER TOWN STUDENTS. TRANSBORDER REALITIES UNVEILS THE INTERSECTIONALITY BETWEEN SOCIAL CLASS, RESIDENCY, AND ECONOMIC STATUS THAT LEAD TO SOCIAL HIERARCHIES IN SCHOOL WHICH CREATE A DIVISION BETWEEN STUDENTS OF DIFFERENT

BACKGROUNDS. EACH OF THE PARTICIPANTS SHARE THEIR EXPERIENCES AS TRANSBORDER OR BORDER TOWN STUDENTS THAT HAVE GREATLY IMPACTED THEM THROUGHOUT THEIR ACADEMIC JOURNEYS. THESE EXPERIENCES HAVE NOT ONLY LED TO STRUGGLES WITH THEIR LANGUAGE, MENTAL HEALTH, AND CAREER AND EDUCATIONAL ENDEAVORS, BUT ALSO PUSHED THEM IN SEARCH OF BETTER OPPORTUNITIES. THIS STUDY BRINGS TO LIGHT THE REALITY OF BEING A TRANSBORDER AND BORDER TOWN STUDENT, WHAT THAT ENTAILS, AND THE EFFECTS ON STUDENTS PURSUING A HIGHER EDUCATION IN THE UNITED STATES.

DAVID HONORATO, HISTORY

FACULTY MENTOR(S): GEORG MICHELS

WHY DID RUSSIAN SOLDIERS JOIN THE RUSSIAN REVOLUTION?

SOLDIERS IN THE RUSSIAN ARMY PLAYED A CRUCIAL ROLE IN THE FEBRUARY AND OCTOBER RUSSIAN REVOLUTIONS OF 1917. IN FEBRUARY 1917 THE SOLDIERS TURNED THEIR WEAPONS AGAINST TSAR NICHOLAS II'S REGIME DUE TO THE MISERABLE CONDITIONS THEY HAD BEEN EXPERIENCING FOR NEARLY THREE YEARS IN THE FRONTLINES AGAINST THE GERMANS IN WWI. THE SOLDIERS' ANGER HAD BEEN DEEPENED BY THE TSARIST EMPHASIS ON PATRIOTISM AND ITS DENIAL OF UNBEARABLE HARDSHIP THE SOLDIERS FACED. THE FEBRUARY REVOLUTION BROUGHT TO POWER THE PROVISIONAL GOVERNMENT WHICH INITIALLY RECEIVED ENTHUSIASTIC APPROVAL AMONG THE SOLDIERS. THE PROVISIONAL GOVERNMENT UNDER THE SOCIALIST ALEXSANDR KERENSKY GAVE THE SOLDIERS HOPES AND ASPIRATIONS FOR THE IMPROVEMENT OF THEIR LOT. FOR EXAMPLE, THE PROVISIONAL GOVERNMENT ABOLISHED THE DEATH PENALTY, WHICH WAS ENFORCED ON INDIVIDUALS WHO COMMITTED SERIOUS POLITICAL AND MILITARY CRIMES. THE PROVISIONAL GOVERNMENT PASSED THE DECLARATION OF SOLDIERS' RIGHTS WHICH GRANTED INNUMERABLE FREEDOMS AND RIGHTS TO THE SOLDIERS. ADDITIONALLY, ORDER NO. 1 REDUCED THE POWER OF THE OFFICERS IN THE RUSSIAN ARMY AND GRANTED THE SOLDIERS THE RIGHT TO ELECT THEIR OWN REPRESENTATIVES. HOWEVER, THE PROVISIONAL GOVERNMENT SOON RETRACTED ON THEIR PROMISES. THE FAILED KERENSKY OFFENSIVE IN JUNE 1917 REMINDED THE SOLDIERS OF THE UNBEARABLE CONDITIONS THEY CONTINUED TO BEAR. THE PROVISIONAL GOVERNMENT REESTABLISHED THE DEATH PENALTY AND RESCINDED ORDER NO. 1 AND RESTORED RUSSIAN ARMY OFFICERS' POWER. THIS FAILURE TO FULFILL ITS INITIAL PROMISES LED THE SOLDIERS TO OVERTHROW THE PROVISIONAL GOVERNMENT IN THE OCTOBER REVOLUTION.

JAR'DAWN HOPKINS, PSYCHOLOGY

FACULTY MENTOR(S): BRENT HUGHES

THE IMPACT OF SOCIAL CONTEXT AND TRAIT WORDS ON SELF-DESCRIPTIVENESS RATINGS

PREVIOUS LITERATURE REVEALS THAT INDIVIDUALS SEEK OUT OTHERS WHO SUPPORT THEIR PRE-EXISTING NOTIONS OF SELF, WITH ACQUAINTANESHIP RESULTING IN REALIZATION AND SUPPORT OF PRESENTED CHARACTERISTICS. IT ALSO REVEALS THAT PEOPLE ARE MOTIVATED TO BE VIEWED POSITIVELY. HOWEVER, THERE MAY BE CERTAIN DIFFERENCES BETWEEN CONTEXTS AND TRAIT CHARACTERISTICS THAT IMPACT A PERSON'S SELF-VIEWS. AS SUCH, WE DEVELOPED A STUDY TO TEST IF PARTICIPANTS VIEW THEMSELVES MORE POSITIVELY IN CASUAL SETTINGS THAN IN ACADEMIC SETTINGS. ADDITIONALLY, WE TESTED TO WHAT EXTENT A TRAIT'S INTERPERSONAL QUALITY IMPACTS HOW PARTICIPANTS RATE THEMSELVES. WE ASKED 41 PARTICIPANTS TO RATE THE SELF-DESCRIPTIVENESS OF 147 TRAITS FROM 1 (NOT SELF-DESCRIPTIVE) TO 7 (VERY SELF-DESCRIPTIVE) IN TWO CONTEXTS (WITH FRIENDS OR AT SCHOOL). A SEPARATE SAMPLE OF 233 MTURK WORKERS DEVELOPED NORMATIVE SCORES FOR THE TRAITS INCLUDING INTERPERSONAL QUALITY, WHICH WE CONSIDER HERE. OUR RESEARCH FOUND THAT INDIVIDUALS RATE THEMSELVES HIGHER ON POSITIVE TRAITS IN CASUAL (WITH FRIENDS) SETTINGS THAN IN ACADEMIC (SCHOOL) SETTINGS, $p < 0.001$. TO EXPLORE WHETHER THIS IS DUE TO THE CHARACTERISTICS OF THE TRAITS BEING RATED, WE CALCULATED WHETHER WORDS HIGHER IN INTERPERSONAL QUALITY INCREASED SELF-RATINGS. WE FOUND A WEAK, POSITIVE CORRELATION BETWEEN THE INTERPERSONAL QUALITY OF THE TRAIT AND THE PARTICIPANTS' SELF-RATINGS, $p < 0.001$. THIS RESEARCH REVEALS POTENTIAL

CONTRIBUTING FACTORS TO EXPLAIN THE MALLEABILITY OF THE SELF ACROSS SOCIAL CONTEXTS.

SHANELLE HUYNH, CREATIVE WRITING

FACULTY MENTOR(S): SUSAN STRAIGHT

WHEN IT'S WRITE: A NOVEL EXCERPT

LUCY AND JULIAN ARE IN THEIR THIRD YEAR OF UNIVERSITY HAVING TO FACE ALL THINGS FRIENDS, FIGHTING, AND FUTURE. LUCY IS SECRETLY ENVIOUS OF HER ROOMMATE, STILL HOPELESSLY IN LOVE WITH HER BOY-NEXT-DOOR BACK IN TEMECULA, AND BATTLING A SERIOUS CASE OF WRITER'S BLOCK. MEANWHILE, JULIAN IS REELING IN THE AFTERMATH OF A BAD BREAKUP, STRUGGLING TO KEEP UP WITH HIS FILM STUDIES, AND AVOIDING DRIVING BACK HOME TO CORONA ON THE WEEKENDS SO HE WON'T HAVE TO FACE THE FACT THAT HIS CHILDHOOD BEST FRIEND IS REALLY GONE. WHO'S TO SAY WHAT WILL HAPPEN WHEN THESE TWO GET PUT TOGETHER IN A GRUELING CREATIVE WRITING CLASS THAT SOON MAKES THEM QUESTION MORE THAN JUST THEIR SKILLS? WHAT COULD GO WRONG? OR BETTER YET, WHAT COULD GO WRITE? I AM WRITING THIS NOVEL FOR SO MANY REASONS: I WANT TO ACCURATELY PORTRAY THE COLLEGE EXPERIENCE; HOW COMPLICATED HUMAN RELATIONSHIPS ARE BUT ALSO HOW BEAUTIFUL; HOW NONE OF US ARE ALONE IN OUR PROBLEMS NO MATTER HOW MUCH IT FEELS LIKE WE ARE, AND THAT NOTHING HAS TO BE PERFECT BECAUSE NOBODY HAS IT FIGURED OUT YET EITHER. WITH THIS PIECE, I WANT TO SHOW POC FAMILY, INTERRACIAL LOVE, HEALTHY FRIENDSHIPS, THE VALIDITY OF CREATIVE MAJORS IN COLLEGE, AND MORE. THE HEART OF THIS STORY IS THAT CHOOSING A LIFE OF ART IS CHOOSING A LIFE OF QUESTIONING AND FACING PAIN THEN STILL FINDING SOME BEAUTY IN IT, IN THE HUMAN EXPERIENCE AND SHARING THIS BEAUTY WITH OTHERS.

EUGENE JUNG, PSYCHOLOGY

FACULTY MENTOR(S): JOHN KIM

K-POP, K-DRAMAS, AND KBBQ: AN ANALYSIS OF THE HALLYU WAVE

OVER THE PAST FEW YEARS, THE WORLD HAS BECOME INUNDATED BY A CULTURAL FORCE, ORIGINATING FROM SOUTH KOREA, CALLED THE HALLYU WAVE. THE WORLD HAS WITNESSED AND EXPERIENCED THE RISE OF THIS NEW PHENOMENON THROUGH A VARIETY OF DIFFERENT MEDIUMS SUCH AS K-POP, K-DRAMAS, K-MOVIES, AND MORE. WHAT MAKES THIS PHENOMENON UNIQUE IS NOT ONLY THE SPEED IT EMPLOYED TO SPREAD ALL OVER THE WORLD BUT HOW THE ACTUAL PHENOMENON IS ALSO AN EXTENSION OF SOUTH KOREA'S OWN HISTORICAL, SOCIETAL, AND ECONOMIC DEVELOPMENT. THE PURPOSE OF MY PAPER, AND THIS PRESENTATION, WILL BE TO EXAMINE THE HALLYU WAVE- THE PHENOMENON THAT DESCRIBES THIS SPREAD OF KOREAN CULTURE ACROSS THE WORLD. MY PRESENTATION WILL ATTEMPT TO NOT ONLY CLEAR UP ANY MISCONCEPTIONS SURROUNDING THE HALLYU WAVE BUT WILL ALSO EXAMINE THE BREAKING POINT OF THE HALLYU WAVE, THE EVENTS THAT ENGENDERED THIS KOREAN PHENOMENON, IN HOPES OF ELUCIDATING ITS COMPLEX AND DARK HISTORY WHILE ALSO PROVIDING THE NECESSARY CONTEXT FOR ITS EMERGENCE. FURTHERMORE, I WILL ALSO EXAMINE THE IMPACT THE HALLYU WAVE HAS HAD ON BOTH SOUTH KOREA AND THE REST OF THE WORLD TO FULLY ILLUSTRATE ITS EXPANSIVE AND GLOBAL NATURE, FINALLY, I WILL ALSO PROVIDE MY PERSONAL THOUGHTS ON THE HALLYU WAVE IN HOPES OF STARTING A MUCH-NEEDED CONVERSATION ABOUT THE CURRENT NATURE AND PROSPECTIVE FUTURE OF KOREAN CULTURE.

ALAAST KAMALABADI, ART HISTORY

FACULTY MENTOR(S): ALEXANDRA LE BLANC

"FUSION": FOOD AND BODY IN CONTEMPORARY BRAZILIAN ART

BRAZILIAN ART HAS ALWAYS SUBSISTED ON NOTIONS OF CARNIVOROUS COSMOPOLITANISM AND CANNIBALISTIC NATIVISM, CONSUMPTION AND SELF-IDENTIFICATION. PREVAILING ART HISTORICAL LITERATURE ON CONTEMPORARY BRAZILIAN ART ALLUDES TO BUT DOES NOT EXPLICITLY INVESTIGATE THE INFLUENCE OF FOOD MATERIALS ON BRAZILIAN ART. THEY DO NOT GENERALLY MOVE BEYOND THE FRAMEWORK OF ANTROPOFAGIA, AN ARTISTIC AND LITERARY MOVEMENT BEGINNING IN 1928 THAT PREMISED ANTHROPOLOGICAL VIEWS OF CANNIBALISM AS A MODE OF REPRESENTATION. FURTHERMORE, SCHOLASTIC FOCUS ON INTERSECTING MODALITIES OF FOOD, RACE, BODY, AND ART IS USUALLY CONSTRAINED TO AFRO-BRAZILIAN ART, IN EFFORTS SUCH AS 2018'S COMPREHENSIVE EXHIBITION AXE BAHIA, BUT DOES NOT EXTEND TO ARTISTS OF OTHER BACKGROUNDS.

I WOULD LIKE TO INVESTIGATE AND COMPLICATE THESE EXCLUSIONS BY ALSO INCORPORATING THE LENS OF BRASILIDADE, A NATIONAL CULTURAL AND ESTHETIC PROJECT THAT BEGAN IN 1922, AND LOOKING AT HOW BRASILIDADE AFFECTS BRAZILIAN ARTISTS WORKING IN THE PAST 50 YEARS. TO THAT END, MY PROJECT EXPLORES AND COMPLICATES WAYS CONTEMPORARY BRAZILIAN ARTISTS SUCH AS LYGIA PAPE, AYRSON HERÁCLITO, ANTÔNIO HENRIQUE AMARAL, AND ARTUR BARRIO FOLD DISCOURSES OF RACIAL AND CULTURAL IDENTITY AND ADDRESS HISTORICAL ISSUES SUCH AS IMPERIALISM, SLAVERY, AND THE INDIGENOUS PAST THROUGH THE USE OF CROPS AND AGRICULTURAL MATERIALS SUCH AS COFFEE, PALM OIL, SUGAR, SUGARCANE JUICE, AND BRAZILWOOD. THROUGH MATERIAL ANALYSES, I EXPLORE THE TWIN NOTIONS OF FOOD-AS-BODY (WHICH I ARGUE IS THE GENERAL FRAMEWORK ASSUMED BY BRASILIDADE) AND BODY-AS-FOOD (THE GENERAL FRAMEWORK ASSUMED BY ANTROPOFAGIA).

HANSA KANTOR, PSYCHOLOGY

FACULTY MENTOR(S): DENVER GRANINGER

THE ORTHODOX AND UNORTHODOX WOMEN OF ANCIENT GREEK CIVILIZATION

THIS PAPER PROVIDES AN INSIGHT INTO THE ORTHODOX AND UNORTHODOX WOMEN OF ANCIENT GREEK SOCIETY, AND IT LOOKS AT WHAT A TYPICAL WOMAN'S LIFE LOOKED LIKE AT THE TIME. THE PAPER LOOKS AT WHAT THE GENERAL LIFE OF AN ORTHODOX WOMAN WOULD HAVE LOOKED LIKE IN TERMS OF TOPOLOGY OF THEIR DAILY CHORES, THEIR INFLUENCE IN THE DOMESTIC, SOCIAL, AND CIVIC SPHERES OF THE ANCIENT GREEK CIVILIZATION. FOLLOWING THIS, SOME EXAMPLES OF UNORTHODOX WOMEN ARE MENTIONED TO PROVIDE A COMPARISON. THIS IS DONE BY DISCUSSING IN DETAIL SOME WELL-KNOWN EXAMPLES OF WOMEN OF ANCIENT GREECE (REAL AND MYTHS) SUCH AS ASPASIA, HELEN, AND MEDEA. ADDITIONALLY, THE REPRESENTATION OF WOMEN ALONG WITH THE ATTITUDES SURROUNDING WOMEN IS COMMENTED ON BY COMPARING ARISTOPHANES' PLAYS WITH EURIPIDES' PLAYS TO PROVIDE A CONTRAST. TO TIE IT ALL TOGETHER, THE PAPER ALSO PROVIDES COMMENTS ON THESE EXAMPLES OF INFLUENTIAL FEMALES AND REPRESENTATION OF WOMEN BY COMPARING THE ATTITUDE TOWARD WOMEN IN THE PRESENT TIMES AND ANCIENT GREEK CIVILIZATION. THE SOURCES OF THIS PAPER INCLUDES THE PLAYS WRITTEN BY EURIPIDES AND ARISTOPHANES AMONG PRIMARY SOURCES ALONG WITH VARIOUS SCHOLARLY ARTICLES AS SECONDARY SOURCES.

MAYA KC-JORDAN, SOCIOLOGY

FACULTY MENTOR(S): MARK WOLFSON

THE MODERN ADDICTION: ANALYZING THE EFFECTS OF THE TOBACCO 21 LAW IN CALIFORNIA AND ITS IMPACTS ON YOUTH HEALTH

AFTER THE WIDESPREAD COMMERCIALIZATION OF TOBACCO PRODUCTS IN THE EARLY 20TH CENTURY, NICOTINE ADDICTION BECAME RAMPANT IN AMERICAN SOCIETY AND IS NOW THE MOST COMMON FORM OF ANY DRUG ADDICTION IN THE UNITED STATES. WHILE THERE HAS BEEN EXTENSIVE RESEARCH THAT ANALYZES THE HEALTH CONSEQUENCES OF TOBACCO USE, OVER 40 MILLION AMERICANS ARE ADDICTED TO NICOTINE PRODUCTS TODAY. OF THOSE WITH NICOTINE ADDICTION, NEARLY 90 PERCENT START BEFORE THE AGE OF EIGHTEEN SUGGESTING THAT THERE IS A SERIOUS LACK OF HEALTH EDUCATION SURROUNDING THE HEALTH CONSEQUENCES OF NICOTINE PRODUCTS. FIRST INTRODUCED IN 2016, THE CALIFORNIA TOBACCO 21 LAW WAS IMPLEMENTED TO MITIGATE THE USE OF NICOTINE AMONG YOUTH. SUPPORTERS OF THE LAW BELIEVE THAT THE INCREASED AGE REQUIREMENT WILL HELP YOUTH MAKE SOCIALLY AND PHYSIOLOGICALLY CONSCIOUS CHOICES AND MAY HELP CURB UNINTENDED ADDICTION. THE PURPOSE OF THIS STUDY IS TO FIND IF THERE IS ANY CORRELATION BETWEEN THE CALIFORNIA TOBACCO 21 LAW AND IMPROVED YOUTH HEALTH LITERACY IN CALIFORNIA. THIS STUDY AIMS TO IDENTIFY IF THE TOBACCO 21 LAW IS SERVING SPECIFIC YOUTH DEMOGRAPHICS AND HOW THIS POLICY HAS SHAPED ECONOMIC AND SOCIO-CULTURAL FORCES IN CALIFORNIA.

ANGELA KIETA, PSYCHOLOGY**TAYLOR CLAAR, PSYCHOLOGY**

FACULTY MENTOR(S): THOMAS SY

A MOBILE APPLICATION INTERVENTION FOR IMPROVING LIFE SATISFACTION, GRATITUDE, AND OPTIMISM

THIS STUDY EVALUATES THE EFFECTS OF A SEVEN-DAY MOBILE GAMING INTERVENTION ON OPTIMISM, GRATITUDE, AND SATISFACTION WITH LIFE (SWL). SWL AND OPTIMISM ARE KEY COMPONENTS OF SUBJECTIVE WELLBEING (DIENER, 2000; SELIGMAN, 2002) WHILE RESEARCH HAS SUPPORTED A POSITIVE RELATIONSHIP BETWEEN GRATITUDE AND POSITIVE EMOTIONS (SHELDON & LYUBOMIRSKY, 2006). THE INTERVENTION USED TAPPIT, A MOBILE MINDSET TRAINING APPLICATION THAT INCORPORATES ASSOCIATIVE CONDITIONING METHODS. PARTICIPANTS UPLOADED PHOTOS THAT EVOKED FEELINGS OF HAPPINESS AND USED THESE PHOTOS TO PLAY GAMES ON THE APP FOR AT LEAST 10 MINUTES DAILY. IT WAS HYPOTHESIZED THAT PARTICIPANTS WOULD EXPERIENCE AN INCREASE IN THEIR LEVELS OF OPTIMISM, GRATITUDE, AND SWL POST-INTERVENTION. A TOTAL OF 52 PARTICIPANTS ($M = 21.4$, $SD = 2.6$) WERE RECRUITED TO COMPLETE THIS INTERVENTION. USING A RETROSPECTIVE PRE-POST APPROACH (LITTLE ET AL., 2020), SWL, GRATITUDE, AND OPTIMISM WERE COMPARED BEFORE AND AFTER THE INTERVENTION. RESULTS REVEALED THAT THERE WERE SIGNIFICANT DIFFERENCES BETWEEN LEVELS OF OPTIMISM, GRATITUDE, AND SWL BEFORE AND AFTER THE INTERVENTION ($p < .05$). SPECIFICALLY, OPTIMISM LEVELS WERE SIGNIFICANTLY HIGHER AFTER THE INTERVENTION ($M = 74.5$) THAN BEFORE ($M = 68.7$) THE INTERVENTION. SIMILARLY, SWL WAS HIGHER POST-INTERVENTION ($M = 74.7$) COMPARED TO BEFORE THE INTERVENTION ($M = 66.5$). LEVELS OF GRATITUDE ALSO INCREASED AFTER THE INTERVENTION ($M = 75.9$) COMPARED TO BEFORE THE INTERVENTION ($M = 66.2$).

HADI KOBALSI, PSYCHOLOGY

FACULTY MENTOR(S): ANNIE DITTA

EFFECTS OF MEMORY GAMES ON LONG TERM LEARNING

THE BRAIN MAY BENEFIT FROM MENTAL PREPARATION BEFORE LEARNING NEW INFORMATION IN ORDER TO MAXIMIZE RETENTION (AKIN TO

WARM-UP EXERCISE FOR THE BODY). PRIOR RESEARCH HAS FOUND THAT THIS TYPE OF ENGAGING MENTAL PREPARATION CAN IMPROVE MEMORY, BUT IT HAS NOT BEEN CONTRASTED AGAINST LESS ENGAGING MENTAL PREPARATION. IN ONE EXPERIMENT, PARTICIPANTS WERE ASKED TO ENGAGE IN ONE OF THREE MENTAL ACTIVITIES PRIOR TO WATCHING A VIDEO LECTURE: 1) PLAY A MEMORY GAME ON EASY DIFFICULTY, 2) PLAY THE SAME MEMORY GAME ON CHALLENGING DIFFICULTY, OR 3) COMPLETE AN ONLINE COLORING TASK (BASELINE). ALL PARTICIPANTS WERE GIVEN A MULTIPLE-CHOICE EXAM 48 HOURS LATER ON THE CONTENTS OF THE LECTURE. WE HYPOTHESIZED THAT THE PARTICIPANTS IN THE CHALLENGING MEMORY GAME CONDITION WOULD HAVE THE BEST MEMORY PERFORMANCE OF THE THREE GROUPS BECAUSE PRIOR WORK HAS SHOWN THAT MENTALLY STIMULATING ACTIVITIES CAN PRIME THE BRAIN TO RECEIVE INFORMATION. LESS ENGAGING/CHALLENGING TASKS MAY NOT HAVE THE SAME EFFECT. A ONE-WAY ANOVA DID NOT DETECT A SIGNIFICANT DIFFERENCE IN MEMORY PERFORMANCE BETWEEN THE THREE GROUPS. HOWEVER, THIS NULL FINDING MAY BE DUE TO CONSTRAINTS OF THE STUDY. DUE TO COVID-19 RESTRICTIONS WE WERE REQUIRED TO CONDUCT THE EXPERIMENT THROUGH ZOOM, WHICH REDUCED OUR ABILITY TO MONITOR PARTICIPANTS' ATTENTION TO THE LECTURE VIDEO AND ENGAGEMENT WITH THE TASKS—A CRITICAL COMPONENT OF THE STUDY. FUTURE WORK WILL BE REQUIRED TO DETERMINE WHETHER MENTAL PREPARATION CAN BENEFIT LEARNING.

MEGAN KUKWA, SOCIOLOGY/LAW & SOCIETY

FACULTY MENTOR(S): BRANDON ROBINSON

EXCLUSIVE SCHOOL-BASED SEX EDUCATION: THE LASTING EFFECTS ON QUEER YOUTH

SCHOOL-BASED SEX EDUCATION IS A MAIN SOURCE OF INFORMATION THAT YOUTH RECEIVE AND HAVE ACCESS TO REGARDING SEX. THESE CURRICULUMS OFTEN FOCUS ON SEXUALLY TRANSMITTED INFECTIONS (STIs) AND PREGNANCY PREVENTION — FRAMING SEX IN A NEGATIVE WAY RATHER THAN SOMETHING THAT CAN BE POSITIVE AND PLEASURABLE. IN ADDITION TO THIS FEARFUL FRAMING, THESE CURRICULUMS ALSO FAIL TO ADDRESS NON-HETEROSEXUAL IDENTITIES SUCH AS LESBIAN, GAY, BISEXUAL, AND QUEER (LGBQ+) YOUTH. WITH MINIMAL TO NO LGBQ+ COVERAGE/REPRESENTATION, SCHOOLS LEAVE QUEER AND QUESTIONING YOUTH WITHOUT A SUPPORT SYSTEM TO LEARN ABOUT DIFFERENT SEXUAL IDENTITIES AND SEX PRACTICES THAT APPLY TO THEM. THIS QUALITATIVE STUDY DRAWS FROM IN-DEPTH INTERVIEWS WITH SOUTHERN CALIFORNIAN QUEER INDIVIDUALS TO RECALL THEIR EXPERIENCES WITH THE PUBLIC SCHOOL SEX EDUCATION SYSTEM AND EXPLORE HOW ITS LIMITED (OR NONEXISTENT) COVERAGE OF QUEER SEXUALITY AFFECTED THEIR PARTICIPATION IN AND UNDERSTANDING OF SEX, SEXUALITY, AND SEXUAL HEALTH. AS THIS STUDY FOUND, PARTICIPANTS NOTED INSTRUCTOR RESISTANCE TO CONTENT OUTSIDE THE HETERO AND/OR ABSTINENT CURRICULUMS, A NEED TO INDEPENDENTLY COMPENSATE FOR A LACK OF IDENTITY-RELEVANT INFORMATION THROUGH VARIOUS MEANS, AND A CONSENSUS THAT EXHAUSTIVE, MULTIYEAR PROGRAMS COVERING MORE TOPICS WOULD REAP GREATER BENEFITS. THESE EXPERIENCES ILLUMINATE WAYS OUR EDUCATIONAL INSTITUTIONS FALL SHORT IN THEIR RESPONSIBILITY TO CREATE COMPREHENSIVE/INCLUSIVE ENVIRONMENTS NECESSARY FOR ADDRESSING QUEER YOUTH AND THEIR NEEDS. EVEN IN A LIBERAL STATE SUCH AS CALIFORNIA, THESE CURRICULUMS RETAINED REPRESSIVE AND HETERONORMATIVE VALUES WHICH HEAVILY SHAPE AND CONSTRAIN YOUTH'S SEXUAL HEALTH, PRACTICES, AND IDENTITIES — AS WELL AS THEIR PARTICIPATION AND ATTITUDES TOWARD THEM IN THE LONG TERM.

FARIN LEA, POLITICAL SCIENCE

FACULTY MENTOR(S): MARISSA BROOKES

ACCESSIBILITY, BARRIERS, CRISIS, AND DISPLACEMENT IN HOUSING: IMPACTS OF SOCIOECONOMIC FACTORS ON HOUSING INSECURITY

CALIFORNIA'S WORSENING HOUSING CRISIS — INVOLVING UNDERSERVED DEMANDS, CONSTRAINED SUPPLY, AND PROTRACTED UNAFFORDABILITY — HAS LED TO HOUSING INSECURITY AMONGST RESIDENTS. WHILE HIGH HOUSING COSTS CAUSE DISPLACEMENT BY PRICING RESIDENTS OUT OF THEIR HOMES, SYSTEMIC FACTORS — POLITICAL, ECONOMIC, AND SOCIAL — ALSO PERPETUATE HOUSING DISPLACEMENT AND INSECURITY AMONGST POPULATIONS. CALIFORNIA'S HIGH HOUSING COSTS DISPROPORTIONATELY BURDEN EXTREMELY LOW- AND VERY

LOW-INCOME HOUSEHOLDS AS WELL AS COMMUNITIES OF COLOR. TO UNDERSTAND WHICH POPULATIONS AND COMMUNITIES ARE MOST SUSCEPTIBLE TO HOUSING INSECURITY AND INACCESSIBILITY, THIS PROJECT EXPLORES THE QUESTION: HOW DO SOCIOECONOMIC FACTORS IMPACT SUSCEPTIBILITY TO HOUSING DISPLACEMENT? THE PURPOSE OF THIS STUDY IS TO PROVIDE INSIGHT INTO DISPARITIES IN HOUSING ACCESSIBILITY AS WELL AS ITS POTENTIAL CAUSES AND CONSEQUENCES UPON THE EVALUATION OF SUSCEPTIBILITY TO HOUSING DISPLACEMENT PRESSURES OF DIFFERENT POPULATIONS AND COMMUNITIES. A COMPARATIVE ANALYSIS BETWEEN SEVEN LOS ANGELES NEIGHBORHOODS – BOYLE HEIGHTS, EXPOSITION PARK, KOREATOWN, MID-CITY, SILVERLAKE, WEST LA, AND WESTLAKE – USING DATA ON SOCIOECONOMIC STATUS, RACIAL COMPOSITION, AND HOUSING DISPLACEMENT PRESSURES PROVIDES INSIGHT INTO THE POTENTIAL RELATIONSHIP BETWEEN SOCIOECONOMIC MARGINALIZATION AND HOUSING INSECURITY WITHIN COMMUNITIES. NEIGHBORHOODS' SOCIOECONOMIC STATUS SCORES AND RACIAL COMPOSITION WERE COMPARED TO THEIR HOUSING DISPLACEMENT PRESSURE SCORES. FINAL OBSERVATIONS REVEALED A STRONGER CORRELATION BETWEEN RACIAL COMPOSITION AND DISPLACEMENT PRESSURES OF NEIGHBORHOODS THAN BETWEEN SOCIOECONOMIC STATUS AND DISPLACEMENT PRESSURES OF NEIGHBORHOODS. UNDERSTANDING THE EXTENT TO WHICH RATES OF HOUSING DISPLACEMENT IMPACT CERTAIN COMMUNITIES IS KEY TO UNDERSTANDING THE NEED FOR POLICY IMPLEMENTATION ON MEASURES THAT ASSIST RESIDENTS, HOUSEHOLDS, AND COMMUNITIES IN GAINING ACCESS TO QUALITY, AFFORDABLE HOUSING.

KRISTEN LIEN, ENGLISH AND SUSTAINABILITY STUDIES

FACULTY MENTOR(S): ANDRE CARRINGTON

ANIMATED QUEER ALTERNATIVES: EXPLORING THE QUEERNESS OF THE NONHUMAN AND RACE IN CONTEMPORARY CHILDREN'S ANIMATION

THIS RESEARCH WILL EXAMINE A SET OF ANIMATED CHILDREN'S SHOWS PRODUCED IN THE 2010s, STEVEN UNIVERSE, SHE RA AND THE PRINCESSES OF POWER, AND KIPO AND THE AGE OF THE WONDERBEASTS. DRAWING FROM RESEARCH IN CRITICAL RACE STUDIES, THIS PROJECT SEEKS TO BRING TOGETHER SCHOLARSHIP IN QUEER ANIMATION STUDIES AND A DEEPER ANALYSIS OF RACE AND IDENTITY, IN ORDER TO ARGUE THAT ANIMATED CHILDREN'S PROGRAMS UNDERSTAND QUEERNESS AS THE REIMAGINING OF THE CATEGORIES OF RACE AND THE NON-HUMAN ANIMAL, WHICH IS FACILITATED THROUGH THE PLASTICITY OF ANIMATION.

BY ATTENDING TO THE SHOWS' VISUAL REPRESENTATION AND UTILIZING RESEARCH FROM PERFORMANCE STUDIES, QUEER STUDIES AND THE HISTORY OF ANIMATION, THIS RESEARCH DEMONSTRATES HOW THESE SHOWS PRESENT "DEVIANT" OR NON-HUMAN FORMS OF BEING AS A WAY OF PUTTING OUR KNOWLEDGE OF PLASTICITY AND QUEERNESS INTO PRACTICE. IN THEIR ENGAGEMENT WITH NONHETERONORMATIVE WAYS OF BEING, THEY WORK THROUGH RELATIONSHIPS BETWEEN QUEERNESS AND RACE IN ORDER TO REACH AN UNDERSTANDING THAT ACCEPTING THE NON-NORMATIVE IS AT THE HEART OF QUEER STRUGGLE.

ANIMATION HAS BEEN ACCEPTED BY QUEER STUDIES AS AN INHERENTLY QUEER MEDIUM WHICH IS ABLE TO BLUR BOUNDARIES BETWEEN SEEMINGLY SECURE CATEGORIES OF GENDER AND SEXUALITY, AS WELL AS THE HUMAN ITSELF. PREVIOUS RESEARCH HAS LACKED AN ANALYSIS OF HOW THE NON-HUMAN IS A RACIALIZED CATEGORY THAT INTERSECTS WITH THE PRODUCTION OF QUEER INTIMACIES AND DESIRES. ULTIMATELY, THESE SHOWS ILLUSTRATE HOW ANIMATION IS AN IDEAL MEDIUM TO ILLUSTRATE THE PLASTICITY OF RACE, HUMANITY AND OTHER CATEGORIES OF BEING.

NICKLAUS LO, PHILOSOPHY AND PSYCHOLOGY

FACULTY MENTOR(S): KATE SWEENEY

CONFRONTING CANCER: EXPLORING LATINA WOMEN'S EXPERIENCES AWAITING A BREAST BIOPSY

PATIENTS AWAITING DIAGNOSTIC NEWS ABOUT THEIR HEALTH OFTEN REPORT HIGH LEVELS OF DISTRESS WHILE JUGGLING BOTH HOPES FOR THE BEST AND FEARS OF THE WORST. THUS, IT IS IMPORTANT TO UNDERSTAND HOW FEATURES OF THE DIAGNOSTIC EXPERIENCE MAY ELICIT DISTRESS. TO THIS END, WE CONDUCTED A PRELIMINARY THEMATIC ANALYSIS OF 119 STRUCTURED INTERVIEWS (CONDUCTED IN SPANISH) WITH LATINA WOMEN UNDERGOING A BREAST BIOPSY PROCEDURE FOCUSING ON FOUR ASPECTS OF THEIR DIAGNOSTIC EXPERIENCE: THEIR PRIMARY EMOTION, ANY PERSISTENT THOUGHTS THEY WERE HAVING, THE HARDEST PART OF THE BIOPSY EXPERIENCE, AND IF THEY'VE FOUND ANY WAYS TO COPE WHILE AWAITING. FROM THESE ACCOUNTS, LATINA PATIENTS CONSISTENTLY IDENTIFIED FEAR AND WORRY ABOUT THE DIAGNOSTIC RESULT AS THEIR PRIMARY EMOTION, WITH UNCERTAINTY BEING A COMMON FOCUS OF PERSISTENT THOUGHTS AND THE HARDEST PART, AND ENGAGING IN PRAYER AND FAMILY-ORIENTED ACTIVITIES AS WAYS TO COPE. ACROSS ALL PROMPTS, PATIENTS ALSO VOICED CONCERNS INDIRECTLY RELATED TO THE PROCEDURE OR RESULT, SUCH AS THEIR GENERAL HEALTH AND ABILITY TO CARE FOR THEIR FAMILY IN THE FUTURE. THESE FINDINGS HIGHLIGHT THE PREVALENCE OF UNCERTAINTY IN PROMPTING PATIENT DISTRESS WHILE AWAITING DIAGNOSTIC NEWS AND OFFER VALUABLE INSIGHTS INTO THE GENUINE CONCERNS AND LIVED EXPERIENCES OF LATINA WOMEN CONFRONTING THE PROSPECT OF BREAST CANCER.

MOIRA LUCARDIE, ANTHROPOLOGY

FACULTY MENTOR(S): NAWA SUGIYAMA

CATHARSIS IN DIONYSIAN ICONOGRAPHY AND RITUAL

THE MAIN FOCUS OF THIS PROJECT IS THE STUDY OF RITUALISTIC PRACTICES SEEN WITHIN DIONYSIAN ICONOGRAPHY OF POTTERY. POTTERY THAT WILL BE PRIMARILY STUDIED WITHIN MY RESEARCH ARE SPECIFICALLY THOSE THAT DEPICT DIONYSUS HIMSELF AND SYMBOLS MOST COMMONLY ASSOCIATED WITH THE WINE DEITY. THE PURPOSE OF MY STUDY INTO THIS DEITY AND THE ICONOGRAPHY SURROUNDING HIM IS DUE TO THE LARGE CONNECTION TO MYSTERY CULTS THAT HE EMULATES AND THE POSSIBLE ORIGINS OF CULTURE EXCHANGE THAT INFLUENCED SHIFTS WITHIN DIFFERING ICONOGRAPHY ON POTTERY FROM DIFFERENT REGIONS. BY STUDYING THE VARIOUS SYMBOLS AND FIGURES COMMONLY ASSOCIATED WITH DIONYSIAN POTTERY, I HOPE TO UNDERSTAND THE BROADER CULTURE WITHIN GREECE AT THE TIME AROUND THE USE OF RITUALS AND IMBIBING LIBATIONS AS EXPRESSIONS OF EMOTIONAL CATHARSIS. FROM THIS, A GREATER UNDERSTANDING OF HOW GREEK CITIZENS SITUATED THEMSELVES IN SYSTEMS OF OPPRESSION AND THEIR NEGOTIATIONS WITH THESE SYSTEMS COULD BE GLEANED.

TAKING IMAGES OF DIONYSIAN POTTERY DATED FROM ARCHAIC AND CLASSICAL PERIODS OF GREECE, I WILL CATALOG THEM USING CATEGORIES ON SPECIFIC FIGURES, SYMBOLS AND MOTIFS. I WILL ALSO CREATE A QUANTITATIVE LIST OF THE SPECIFIC STYLES USED BY THE ARTISTS, WHERE THE POTTERY WERE FOUND AND CREATED, WHAT TIME PERIOD THEY ORIGINATED, AND WHEN AND WHERE THE ARTISTS WERE MOST ACTIVE. FROM THIS, I WOULD CONDUCT FURTHER RESEARCH WITHIN THESE SPECIFIC STYLES AND CONTEXTS TO GAIN A BETTER UNDERSTANDING OF THE CULTURE THAT SURROUNDED SUCH PIECES OF MYTHOLOGICAL AND RITUAL SIGNIFICANCE.

ALYSSA LUNA, PSYCHOLOGY/LAW AND SOCIETY

FACULTY MENTOR(S): ELIZABETH DAVIS

THE SOCIO-EMOTIONAL DEVELOPMENT BEHIND THE CRIMINAL MIND

MURDERS ARE WOLVES IN SHEEP'S CLOTHING, CONSTANTLY ROAMING WITH US THROUGHOUT SOCIETY. ALTHOUGH PRIOR RESEARCH HAS INVESTIGATED SOME OF THE MOTIVATIONS BEHIND THE CRIMINAL MIND, THERE IS STILL A LACK OF EVIDENCE PERTAINING TO THE SOCIAL-EMOTIONAL DEVELOPMENTAL PROCESSES THAT CONTRIBUTE TO THESE INDIVIDUALS' BEHAVIORS. IN PARTICULAR, THERE IS A PAUCITY OF RESEARCH ON HOW KILLERS ARE INFLUENCED AND MOLDED THROUGH EMOTIONAL SOCIALIZATION THROUGHOUT THEIR CHILDHOOD. BY UNDERSTANDING HOW EARLY CHILDHOOD SOCIALIZATION OF EMOTIONS CAN INFLUENCE THE BEHAVIORS OF VIOLENT KILLERS, WE CAN HAVE

A BETTER UNDERSTANDING OF WHAT MAKES THESE INDIVIDUALS TURN TO A DARK LIFESTYLE. IT IS IMPORTANT TO EXTEND RESEARCH INTO THIS AREA AS THE F.B.I OFTEN RELY ON METHODS OF BEHAVIORAL ANALYSIS WITHIN THEIR CRIMINAL PROFILING DEPARTMENT TO BRING KILLERS TO JUSTICE. THROUGHOUT THIS QUALITATIVE ANALYSIS, THE CHILDHOOD AND HOMICIDES OF TWO FAMOUS SERIAL KILLERS, TED BUNDY AND JEFFERY DAHMER, WILL BE EXAMINED AND ANALYZED. INFORMATION WAS GATHERED BY ANALYZING CRIME CASES, DOCUMENTARIES, INTERVIEWS, AND EXISTING BIOGRAPHIES. THESE FINDINGS WILL HELP CONTRIBUTE TO THE SCIENTIFIC STUDY OF CRIMINOLOGY, AS UNDERSTANDING THE BEHAVIORAL AND EMOTIONAL DEVELOPMENTAL PSYCHOLOGY OF CRIMINALS IS A CRUCIAL PART OF THE INVESTIGATION PROCESS. BECOMING MORE WELL-INFORMED AND KNOWLEDGEABLE IN THE SUBJECT OF CRIMINAL PATHOLOGY WILL IMPROVE THE RATE OF CRIME-SOLVING BY ALLOWING LAW ENFORCEMENT TO HAVE A BETTER IDEA OF WHO TO SPECIFICALLY LOOK FOR IN HOMICIDE CASES.

JANET MARINGKA, ECONOMICS/ADMINISTRATIVE STUDIES

FACULTY MENTOR(S): JENNIFER MEROLLA

THE ROLE OF MEDIA IN SHAPING PUBLIC OPINION: A CASE STUDY OF PRESIDENT TRUMP'S USE OF SOCIAL MEDIA AND ITS IMPACT ON THE INSURRECTION IN THE U.S. CAPITOL

FORMER PRESIDENT DONALD TRUMP UTILIZED VARIOUS SOURCES OF MEDIA DURING HIS PRESIDENCY TO GET HIS IDEAS ACROSS TO HIS FOLLOWERS. HIS MOST USED MEDIA, TWITTER, WAS WHERE HE DIRECTLY CONNECTED TO HIS FOLLOWERS, AND IT WAS WHERE HIS FOLLOWERS RECEIVED MOST OF THEIR NEWS ABOUT THE 2020 ELECTION. IN THIS STUDY, I WILL BE TRACKING TRUMP'S ORIGINAL TWEETS THAT FOCUS ON THE PHRASE "ELECTION FRAUD" AND VARIOUS NEW ARTICLES THAT COVER IT TO SHOW HOW IT HAD INFLUENCED HIS FOLLOWERS DURING HIS 2020 PRESIDENTIAL CAMPAIGN. THIS WILL ENCOMPASS TWEETS AND ARTICLES FROM AUGUST 2020 TO JANUARY 2021. THIS ANALYSIS IS DONE TO SHOW HOW PEOPLE'S CONSTANT ACQUISITION OF CERTAIN STRONG POINTS OF VIEW CAN CREATE EXTREME IDEOLOGIES THAT CAN ENDANGER INDIVIDUALS AND THOSE AROUND THEM. IT WILL SHOW THE CORRELATION BETWEEN THE IDEA OF ELECTION FRAUD AND HOW IT HAD LED TRUMP'S FOLLOWERS TO STORM THE CAPITOL DURING THE JANUARY 6TH INSURRECTION.

ANDREW MARTIN, PHILOSOPHY & EDUCATION

FACULTY MENTOR(S): LUCA FERRERO

AGENTIAL DISTORTION AND CRITICAL CURRICULUM STUDIES

THE ROLE OF AGENCY HAS EXISTED WITHIN CURRICULUM STUDIES FOR SOME TIME. RECENTLY, CURRICULUM SCHOLARS HAVE EMPHASIZED FOSTERING POLITICAL AND SOCIAL AGENCY WITHIN STUDENTS. WHILE THESE FACTORS ARE VITAL TO A STUDENT'S ABILITY TO DELIBERATE ON, AND ACT, WITHIN CLASSROOMS AND THE WORLD OUTSIDE, LITTLE WORK IS DONE CONNECTING CONTEMPORARY PHILOSOPHY OF ACTION TO THEORETICAL UNDERPINNINGS OF AGENCY WITHIN CURRICULUM STUDIES. I EXPLORE WHY WORK IN THE PHILOSOPHY OF ACTION OUGHT TO BE INTRODUCED TO CONCEPTIONS OF AGENCY HELD BY CURRICULUM SCHOLARS, AS WELL AS PRESENT THE JOINT PROBLEM BOTH DISCIPLINES ARE INVESTIGATING.

BY CONSIDERING HOW PHILOSOPHY OF ACTION IS RELEVANT TO ISSUES OF AGENCY BY WAY OF DELIBERATION AND INTENTIONAL ACTION, I ARGUE THAT THERE ARE CLEAR PARALLELS SHARED WITH CRITICAL CURRICULUM SCHOLARS' GOALS OF FOSTERING STUDENT AGENCY. BY INCORPORATING THEORETICAL ACCOUNTS FROM PHILOSOPHY OF ACTION CURRICULUM SCHOLARS WOULD ACQUIRE STRONGER ACCOUNTS OF NOT JUST AGENCY, BUT A DEEPER UNDERSTANDING OF WHAT THREATENS TO DISTORT AGENCY.

FINALLY, I FOCUS ON A MAJOR PROBLEM THAT CRITICAL CURRICULUM SCHOLARS TAKE FOR GRANTED: THAT WHEN AGENTS ARE OPERATING WITHIN INSTITUTIONS, TO TRY AND MITIGATE AGENTIAL DISTORTION THROUGH STRICTLY A POLITICAL PROJECT IGNORES THE DISTORTING

NATURE OF INSTITUTIONS. HOWEVER, BY CONSIDERING GUIDELINES DEVELOPED IN PHILOSOPHY OF GAMES THERE MIGHT BE WAYS TO MITIGATE SUCH AGENTIAL DISTORTION.

JENIFER MEDINA, ANTHROPOLOGY

FACULTY MENTOR(S): KATJA GUENTHER

"IT'S NOT PERMACULTURE, IT'S ANCESTRAL KNOWLEDGE:" EXPLORING BLACK, QT, AND POC PARTICIPANT NARRATIVES OF THE US PERMACULTURE MOVEMENT

PERMACULTURE IS A TRANSNATIONAL SOCIAL MOVEMENT AND A CONCEPTUAL DESIGN FRAMEWORK THAT IS UTILIZED BY ITS PRACTITIONERS TO BUILD REGENERATIVE SYSTEMS APPLICABLE—BUT NOT LIMITED TO— FOOD AND HUMAN SETTLEMENTS. DEVELOPED IN THE 1970S THROUGH ACADEMIC RESEARCH ON FIRST PEOPLE'S TRADITIONAL ECOLOGICAL KNOWLEDGE, PERMACULTURE IS INCREASINGLY BECOMING A FLOURISHING SUSTAINABILITY TREND AND ECONOMIC VENTURE AMONG ITS AFFLUENT, EUROPEAN-DESCENT PARTICIPANT MAJORITY. THUS, A GROWING NUMBER OF ACTIVISTS AND LEADERS IN AGGREGATE SOCIAL JUSTICE MOVEMENTS CRITIQUE PERMACULTURE AS A FORM OF 'NEO-COLONIALISM,' BUILDING UPON OTHER CONCERNS THEY VOICE ABOUT THE MOVEMENT, SUCH AS ITS LACK OF PARTICIPANT DIVERSITY AND INACCESSIBLE MODES OF DISSEMINATION. AGAINST THIS BACKDROP, THIS PROJECT IS THE FIRST ANTHROPOLOGICAL DOCUMENTATION OF THE EXPERIENCES OF US-BASED UNDERREPRESENTED-MINORITY PARTICIPANTS, NAMELY THOSE WHO IDENTIFY AS BLACK, A PERSON OF COLOR (POC), QUEER, LOW-INCOME, UNDOCUMENTED, AND/OR IMMIGRANT. THIS RESEARCH DOCUMENTS THE VARYING WAYS IN WHICH PARTICIPANTS' EXPERIENCES IN THE MOVEMENT ARE INFORMED BY THEIR INTERSECTING IDENTITIES THROUGH QUALITATIVE INTERVIEWS WITH 7 PERMACULTURISTS (6 OF WHOM IDENTIFY AS WOMEN, QUEER FEMME, OR NONBINARY) FROM AROUND THE NATION-STATE. FINDINGS DELINEATE THE WAYS IN WHICH PERMACULTURE IS USED AS A CONCEPTUAL AND PRACTICAL TOOL FOR SOCIAL JUSTICE, HOLISTIC CONNECTION, AND HEALING BY THESE PARTICIPANTS, WHILE ALSO REVEALING THE WAYS IN WHICH THEIR PRACTICES DIVERGE FROM 'WHITESTREAM' PERMACULTURE. MOREOVER, I COMMUNICATE PARTICIPANT-IDENTIFIED AVENUES OF ENGAGEMENT FOR QTBIPOC INTERESTED IN PARTICIPATING IN PERMACULTURE AND DISTILL LESSONS FOR THE MOVEMENT TO BETTER SUPPORT AND ENGAGE DIVERSE AUDIENCES.

ADITI MEKALA, NEUROSCIENCE

PHOEBE TAT, PSYCHOLOGY

STELLA AURELIA, PURE STATISTICS

FACULTY MENTOR(S): AARON SEITZ

VALIDATION OF REMOTE AUDITORY ASSESSMENTS USING PORTABLE AUTOMATIC RAPID TESTING (PART)

THE PORTABLE AUTOMATIC RAPID TESTING (PART) IS AN APPLICATION DEVELOPED BY THE BRAIN GAME CENTER (BGC) THAT CAN BE RUN ON VARIOUS DEVICES AND COLLECT SPATIAL, SPECTRAL, AND TEMPORAL INFORMATION THROUGH A SERIES OF AUDITORY ASSESSMENTS. IN PREVIOUS RESEARCH, LARREA-MANCERA ET AL. (2020) ADMINISTERED ASSESSMENTS VIA PART IN A LABORATORY SETTING WITH CALIBRATED EQUIPMENT AND OBTAINED HIGH REPEATABILITY IN PERFORMANCE ACROSS CONDITIONS. HERE WE PRESENT RESULTS OF A STUDY CONDUCTED DURING THE COVID-19 PANDEMIC, TO REPLICATE LARREA-MANCERA ET AL. (2020) AND VALIDATE THE REPEATABILITY OF PART IN A LESS SUPERVISED REMOTE SETTING ON CALIBRATED AND UNCALIBRATED DEVICES. 40 UCR UNDERGRADUATES USED UNCALIBRATED PERSONAL DEVICES REMOTELY WITH SUPERVISION VIA VIDEO CALL TO COMPLETE THESE ASSESSMENTS. FURTHER EXPERIMENTS WITH TWO GROUPS OF PARTICIPANTS IN LAB (N=58) AND AT HOME (N=36) WERE CONDUCTED TO DETERMINE WHETHER DEVICE CALIBRATION OR TESTING ENVIRONMENT INFLUENCED TASK PERFORMANCE. PARTICIPANTS WERE INSTRUCTED TO USE PERSONAL

DEVICES OR LABORATORY DEVICES DURING SESSIONS EITHER REMOTELY OR IN THE LAB. MANOVA TESTS SHOW NO EVIDENCE OF NEITHER EQUIPMENT NOR LOCATION PLAYING A SIGNIFICANT ROLE IN PERFORMANCE. ADDITIONALLY, THE AMOUNT OF PREVIOUS MUSICAL TRAINING OF PARTICIPANTS WAS EXPLORED IN ITS RELATION TO PERFORMANCE. THERE WERE NO SIGNIFICANT CORRELATIONS BETWEEN THE AMOUNT OF PREVIOUS MUSICAL TRAINING WITH PERFORMANCE ON ANY OF THE MEASURES TESTED. OVERALL, THESE RESULTS SHOW THAT PART IS A VALID TOOL TO USE REMOTELY WITH PARTICIPANT OWNED DEVICES AND CAN SUPPORT MORE AND LARGER SCALE STUDIES AIMING TO INVESTIGATE RELATIONSHIPS BETWEEN HEARING, MUSIC AND OTHER TOPICS.

HALEY MELENDEZ, PSYCHOLOGY

FACULTY MENTOR(S): ANNIE DITTA

ACADEMIC PERFORMANCE AND REDEFINING SPACE

DURING THE COVID-19 PANDEMIC, STUDENTS FACED THE UNIQUE CHALLENGE OF HAVING TO TRANSITION TO COMPLETELY VIRTUAL CLASSES. WITH THIS TRANSITION, MANY STUDENTS LOST ACCESS TO THE DEDICATED LEARNING SPACE THAT CAMPUS PROVIDED TO THEM. ANECDOTALLY, STUDENTS REPORTED FEELING A LACK OF SEPARATION BETWEEN SCHOOL AND HOME THAT MADE IT DIFFICULT TO FOCUS ON SCHOOLWORK. THUS, THE AIM OF THIS RESEARCH WAS TO EVALUATE STUDENTS' PERCEPTIONS OF STUDYING VIRTUALLY BY WAY OF UTILIZING "SPACE-BLOCKING," A STUDY TECHNIQUE DESIGNED TO CREATE SEPARATION BETWEEN ONE'S HOME AND VIRTUAL SCHOOL ENVIRONMENT. FORTY-SEVEN UC RIVERSIDE STUDENTS WERE RECRUITED FOR THE STUDY. HALF OF THE PARTICIPANTS WERE ASKED TO IMPLEMENT SPACE-BLOCKING FOR ONE QUARTER (I.E., DEDICATE ONE AREA OF THEIR LIVING SPACE ONLY FOR THE COMPLETION OF SCHOOL WORK), WHILE THE OTHER HALF CONTINUED WITH THEIR TYPICAL STUDY TECHNIQUES WITHOUT EXPLICIT INSTRUCTION ABOUT WHERE TO COMPLETE THE WORK. BOTH GROUPS WERE SURVEYED ABOUT THEIR ACADEMIC EXPERIENCES AT FOUR TIME POINTS THROUGHOUT THE QUARTER. STUDENTS WHO USED SPACE-BLOCKING REPORTED THAT THEY AGREED THAT IT HELPED THEM ACADEMICALLY. ADDITIONALLY, THEY PERCEIVED THAT THEY WERE ABLE TO FOCUS BETTER WHILE STUDYING AND IN CLASSES BECAUSE OF IT. COMPARED TO THOSE WHO DID NOT USE SPACE-BLOCKING, THESE STUDENTS REPORTED THAT THEY NEITHER AGREED OR DISAGREED THAT THEY WERE ABLE TO FOCUS OR STUDY ANY BETTER AT THE END OF THIS STUDY RELATIVE TO WHEN THEY FIRST BEGAN. OVERALL, THE POTENTIAL USEFULNESS OF SPACE-BLOCKING AS A STUDY TECHNIQUE FOR STUDENTS MAY BE ABLE TO BE APPLIED TO POST-PANDEMIC ONLINE CLASSES.

SUSY MORALES-BENITEZ, SOCIOLOGY

FACULTY MENTOR(S): JENNIFER NAJERA

LATINX UNDOCU-PROFESSIONALS, NOT CRIMINALS: COMMUNITY CULTURAL WEALTH, NARRATIVES, AND IMPACT

MY PROJECT COUNTERS DISCOURSES THAT CRIMINALIZE UNDOCUMENTED LATINX IMMIGRANTS BY EXAMINING THE NARRATIVES OF SIX UNDOCUMENTED LATINX PROFESSIONALS (WHO I REFER TO AS UNDOCU-PROFESSIONALS) THROUGH A COMMUNITY CULTURAL WEALTH (CCW) FRAMEWORK, WHICH CENTERS EXISTING RESOURCES AND CAPITAL THAT HELPS MARGINALIZED COMMUNITIES RESIST OPPRESSION. DRAWING ON THE SIX PILLARS OF CCW, I IDENTIFY HOW UNDOCU-PROFESSIONALS NAVIGATE ACADEMIA, RELATIONSHIPS, EMPLOYMENT, AND THEIR CAREERS IN THE U.S. WHILE BUILDING ON EXISTING KNOWLEDGE, ABILITIES, AND CONTACTS. CCW LEGITIMIZES THE SKILLS AND TEACHINGS THAT UNDOCU-PROFESSIONALS LEARNED WITHIN THEIR COMMUNITIES. THROUGH A TEXTUAL ANALYSIS OF THEIR VIRTUAL SPEAKING ENGAGEMENTS ON ZOOM AND SOCIAL MEDIA POSTS FROM 2021. MY PROJECT FINDINGS ILLUSTRATE HOW UNDOCU-PROFESSIONALS USE MULTIPLE CCW PILLARS TO NAVIGATE THROUGH FORMAL/INFORMAL PROCESSES TO NETWORK, SECURE EMPLOYMENT OPPORTUNITIES, FORMULATE GOALS, AND IDENTIFY CAREERS. MY FINDINGS ALSO REVEAL THAT IDENTIFYING A SUPPORTIVE COMMUNITY IS INTEGRAL FOR UNDOCU-PROFESSIONALS TO SURVIVE AND CONFRONT STATE- SANCTIONED MECHANISMS OF CRIMINALIZATION AND IDENTIFY ALTERNATIVE PATHS TO ATTAIN THEIR CAREER GOALS. THESE FINDINGS SHOW HOW, AS A RESULT OF STATUS LIMITATIONS, UNDOCU-

PROFESSIONALS HAVE LEVERAGED THEIR COMMUNITY KNOWLEDGE AND SKILL-SETS TO HELP THEM NAVIGATE PROFESSIONAL DEVELOPMENT. ADDING TO THE EXISTING LITERATURE ON NON-TRADITIONAL FORMS OF EPISTEMOLOGY, THESE FINDINGS COLLECTIVELY PRESENT A COUNTER STORY, AMPLIFYING AND BROADENING THE CONVERSATION ON LATINX UNDOCUMENTED IMMIGRANTS' AGENCY. THIS RESEARCH REAFFIRMS UNDOCU-PROFESSIONALS' FRUSTRATION, INGENUITY, AND PERSEVERANCE, AND CALLS ON U.S. SOCIETY TO INTERROGATE CONSTRUCTIONS OF ILLEGALITY AND THE STRUCTURAL BLAST RADIUS OF USCIS, ICE, CBP AS THEY CONSTITUTE THE BARRIERS UNODOCU-PROFESSIONALS FACE.

MELISSA MORFIN, POLITICAL SCIENCE/ PUBLIC SERVICE

FACULTY MENTOR(S): MICHAEL SOLIS

READING INTERVENTIONS: IMPROVING LOW READING COMPREHENSION IN ELEMENTARY

HAVING STRONG READING COMPREHENSION SKILLS IS A SIGNIFICANT FACTOR IN A CHILD'S ACADEMIC SUCCESS, PARTICULARLY AS IT RELATES TO UPPER ELEMENTARY. IT IS CRUCIAL TO ADDRESS LOW READING COMPREHENSION IN THE 4TH GRADE BEFORE CHILDREN ARE REQUIRED TO READ MORE COMPLEX STRUCTURES AS PREVIOUS STUDIES HAVE DEMONSTRATED THAT READING PROBLEMS WILL ONLY PERSIST. THE MISSION OF THIS SYNTHESIS IS TO INVESTIGATE THE EFFICACY OF A VOCABULARY AND TEXT-BASED INTERVENTION FOR STUDENTS (GRADES 1-5) THAT HAVE BEEN IDENTIFIED AS HAVING A LOW READING COMPREHENSION TO FIND BETTER LEARNING METHODS FOR SIMILAR STUDENTS. INTERVENTIONS ADDRESSING DECODING, FLUENCY, VOCABULARY, AND COMPREHENSION WERE INCLUDED IF THEY MEASURED THE EFFECTS ON READING COMPREHENSION. SIX STUDIES THAT RANGED BETWEEN 2000 AND 2017 WERE SYNTHESIZED BECAUSE THEY MET THE META-ANALYSIS CRITERIA. FIVE OF THESE STUDIES HAD A TREATMENT AND COMPARISON DESIGN, AND ONE WAS A QUASI-EXPERIMENTAL STUDY.

CAYLA NEWMAN, MEDIA AND CULTURAL STUDIES AND CREATIVE WRITING

FACULTY MENTOR(S): AMALIA CABEZAS

AS GOOD AS IT GETS: WHAT LIFESTYLE CONTENT MEANS IN 2022

AS THE 2020S PROGRESS, THERE HAS BEEN A NOTICEABLE SHIFT IN THE ONLINE WORLD'S DEFINITION OF AN ASPIRATIONAL LIFESTYLE FOR YOUNG WOMEN. INSTEAD OF LAVISH, LUXURIOUS LIVING, TODAY'S ONLINE CONTENT EMPHASIZES VISUAL TRANSLATIONS OF PRODUCTIVITY, HOLISTIC HEALTH, AND SELF-CARE. WITH THIS VIDEO ESSAY, I HOPE TO DEMONSTRATE HOW THE SHIFT IN AN ASPIRATIONAL LIFE, AS PORTRAYED BY ONLINE LIFESTYLE CONTENT, REPRESENTS THE HARSH REALITIES OF THE CONTEMPORARY WORLD. I WILL FOCUS ON HOW THIS LIFESTYLE IS COMMUNICATED THROUGH VISUALLY-ORIENTED SOCIAL MEDIA PLATFORMS, INCLUDING INSTAGRAM, TIKTOK, AND YOUTUBE, AND THE CONTENT THAT I FIND WILL SERVE AS MY PRIMARY SOURCES. THIS FOOTAGE WILL BE SEARCHED THROUGH ONLINE HASHTAGS SUCH AS "#PRODUCTIVITY," "#LIFESTYLE," AND "#THATGIRL." IN THE VIDEO COMPONENT, I WILL USE THESE AS B-ROLL FOOTAGE, SET APPROPRIATELY TO MY VOICEOVER NARRATION. IN THIS NARRATION, I WILL PROVIDE ANALYSIS OF THESE POSTS AND WHAT THEY MEAN IN THE CONTEXT OF FACTS AND FIGURES ABOUT THE STATE OF THE CONTEMPORARY WORLD FOR YOUNG AMERICANS. I WILL ALSO PRESENT ANALYSIS FROM VARIOUS CONTEMPORARY AUTHORS TO HELP ILLUSTRATE THE DEEPER MEANING BEHIND MODERN LIFESTYLE COMPONENTS. MY FINDINGS SHOW A BACKDROP OF TUMULTUOUS WORLD EVENTS THAT ADD CONTEXT TO THE PREVALENCE OF TODAY'S MOST POPULAR LIFESTYLE CONTENT. WITH THESE FINDINGS, I HOPE TO ILLUSTRATE A DEEPER TRUTH BEHIND THESE SOCIAL MEDIA POSTS AND HASHTAGS, UNDERSTANDING HOW THEY ACT AS A RESPONSE TO OUR CURRENT PERIOD IN HISTORY AND FUNCTION AS A MEANS OF SURVIVAL IN SUCH DIFFICULT TIMES.

KYLE NGUYEN, HISTORY AND POLITICAL SCIENCE/INTL AFFAIRS

FACULTY MENTOR(S): THOMAS COGSWELL

HOW CALIFORNIA'S ANTI-JAPANESE SENTIMENTS INFLUENCED U.S. FOREIGN POLICY POST-WWI

CALIFORNIA HAS BEEN NOTORIOUS FOR ITS XENOPHOBIC ATTITUDES WHICH HAVE BEEN TARGETED AT PEOPLE OF JAPANESE DESCENT. THE "YELLOW PERIL" OF ASIAN IMMIGRATION AND ITS SUBSEQUENT "SILENT INVASION" WAS MET WITH TARGETED LEGISLATION AIMED AT HINDERING AND DISCOURAGING JAPANESE IMMIGRATION AND SETTLEMENT IN CALIFORNIA. BEGINNING WITH THE ALIEN LAND LAWS OF 1913 AND 1920, CALIFORNIA POLITICIANS MADE IT EXTREMELY DIFFICULT FOR JAPANESE-AMERICANS TO OWN LAND AND ESTABLISH PERMANENT LIVES. TWO OF THE MOST PROMINENT ANTI-JAPANESE POLITICAL FIGURES WERE THE FORMER CALIFORNIA GOVERNOR AND U.S. SENATOR HIRAM JOHNSON AND THE FORMER SAN FRANCISCO MAYOR AND U.S. SENATOR JAMES PHELAN. UNDER JOHNSON'S GOVERNORSHIP, CALIFORNIA PASSED THE ALIEN LAND LAW OF 1913. ALTHOUGH OUT OF POLITICAL OFFICE, PHELAN WAS STILL A MAJOR PROPONENT OF THIS BILL'S INCEPTION AND PASSING. THEIR ROLES IN INFLUENCING ANTI-JAPANESE LEGISLATION IN CALIFORNIA BEG THE QUESTION OF WHAT BOTH MEN AS SENATORS, BROUGHT TO THE NATIONAL STAGE. DURING PARIS PEACE CONFERENCE THE JAPANESE, WHO WERE ALLIES OF THE U.S. DURING THE FIRST WORLD WAR, WERE SEEMINGLY DISRESPECTED AND IGNORED WHEN PETITIONING FOR TOTAL POLITICAL EQUALITY AMONGST NATIONS, REGARDLESS OF RACE, WITHIN THE INTERNATIONAL COMMUNITY. THE UNITED STATES PUSHED HARD AGAINST ANY SORT OF "EQUALITY CLAUSE" SINCE IT WOULD UNDERMINE THE RACISM AND XENOPHOBIA OF THE TIME. THIS RAISES THE QUESTION OF HOW JOHNSON AND PHELAN MAY HAVE INFLUENCED FELLOW SENATORS AND PRESIDENT WILSON. THROUGH EXAMINING HOW BOTH SENATORS FROM CALIFORNIA BROUGHT THEIR DOMESTIC SENTIMENTS TO THE SENATE, THEIR INFLUENCE OVER U.S. FOREIGN POLICY MAY BE REVEALED.

SAMANTHA PARK, CREATIVE WRITING / ENGLISH

FACULTY MENTOR(S): ALLISON WHITE

UNDERSTANDING CHILDHOOD TRAUMA THROUGH POETRY

CHILDHOOD IS VITAL TO THE DEVELOPMENT OF AN INDIVIDUAL. IT LAYS DOWN THE FOUNDATION FOR WHO A PERSON BECOMES AND INFLUENCES THE WAY THEY BEHAVE, REACT, AND RESPOND AS AN ADULT. WHEN THAT PERIOD OF TIME IS MARRED BY TRAUMA HOWEVER, IT CAN LEAVE LASTING IMPACTS THAT AFFECT A VARIETY OF ASPECTS, INCLUDING MENTAL HEALTH AND MEMORY. IN MY CAPSTONE PROJECT, I AIM TO EXPLORE HOW CHILDHOOD TRAUMA AFFECTS AN INDIVIDUAL, ESPECIALLY WHEN THERE IS MEMORY LOSS OR A BLOCKAGE. THROUGH WRITING A COLLECTION OF POETRY THAT IS BASED AROUND PERSONAL EXPERIENCES AND INSPIRED BY SIMILAR LITERATURE, I HOPE TO ATTEMPT TO ANSWER THIS QUESTION USING WRITING AS A TOOL FOR COPING AND HEALING. POETRY BOOKS SUCH AS EUGENIA LEIGH'S BLOOD, SPARROWS, AND SPARROWS, BETH BACHMANN'S TEMPER, AND DONIKA KELLY'S BESTIARY WILL SERVE AS A BASIS FOR MY OWN WORK, AS WELL AS A MEANS INTO WHICH I CAN ENTER INTO THE ONGOING CONVERSATION OF CHILDHOOD ABUSE, TRAUMA, AND VIOLENCE IN LITERATURE. BY DOING SO, OTHERS MAY CONNECT TO IT AND TAKE AWAY WHAT THEY NEED, OR WANT, IN ORDER TO HELP THEM COPE WITH THEIR OWN SUBCONSCIOUS AND/OR CONSCIOUS TRAUMA THROUGH ART.

ELIZABETH PEDROZA, MEDIA AND CULTURAL STUDIES

FACULTY MENTOR(S): TOBY MILLER

SOCIAL MEDIA ENGAGEMENT AS A NEW WAY TO BOND

SOCIAL MEDIA ENGAGEMENT WITHIN INSTITUTIONS WHO ARE SEEKING TO CATER TO THEIR AUDIENCE HAS BEEN A PERSISTENT AND DEVELOPING PHENOMENON IN THE PAST FEW YEARS. IT IS IMPORTANT THAT ALL PARTICIPANTS UNDERSTAND HOW TO ENGAGE WITH SOCIAL MEDIA AND THE CONSEQUENCES IT BRINGS. ENGAGEMENT IS USED TO TRACK POPULARITY AMONG ACCOUNTS, AND THIS POPULARITY BRINGS FORTH A SENSATION OF CLOSENESS. THE MORE INTERACTIONS THERE ARE WITH PEOPLE ON THESE ACCOUNTS, THE MORE THE DIGITAL BOND FORMS. IN ORDER TO DEVELOP THE STUDENT COMMUNITY, ONE MUST UNDERSTAND WHAT STUDENTS ARE INTERESTED IN AND MAKE THAT THE BASE OF SOCIAL NETWORKING. THROUGH TRACKING THE INSIGHTS OF THE UNIVERSITY HONORS SOCIAL MEDIA ACCOUNTS EG. INSTAGRAM, FACEBOOK, TWITTER AFTER POSTING SPECIFIC CONTENT WEEKLY, I HOPE TO PRODUCE RESEARCH THAT WILL HELP GENERATE PERSONALIZED POSTS. THOSE POSTS CAN HELP STUDENTS ENGAGE WITH UNIVERSITY HONORS SOCIAL MEDIA ACCOUNTS, AND AUGMENT THE BOND BETWEEN THEM AND THE INSTITUTION. MY HYPOTHESIS IS THAT STUDENTS LIKE TO ENGAGE WITH CONTENT THAT INCLUDES THEIR PEERS, FACULTY, ALUMNI, BECAUSE IT BRINGS FORTH THE NOTION OF CLOSENESS AND HENCE A BOND. BY USING QUANTITATIVE DATA, I TRACKED INSIGHTS WEEKLY OF THE SPECIFIC POSTS I WAS EVALUATING AND RECORDED THIS DATA ON AN EXCEL SHEET. AFTER THE DESIGNATED TIME FRAME, MY HYPOTHESIS WAS REINFORCED THROUGH THIS STUDY. PEOPLE FOLLOWING THE UNIVERSITY HONORS ACCOUNTS DID ENGAGE MORE WITH CONTENT THAT INCLUDED OTHER PEOPLE. MOVING FORWARD, THIS ALLOWS HONORS ACCOUNTS TO POST CONTENT THAT WILL INCREASE OUR ENGAGEMENT THEREFORE ENHANCING OUR BOND WITH STUDENTS.

GEE PINEDA, GENDER & SEXUALITY STUDIES/MEDIA & CULTURAL STUDIES

FACULTY MENTOR(S): BRANDON ROBINSON, SETSU SHIGEMATSU

LET'S TALK ABOUT #TRANSLIVESMATTER: A CRITICAL INTERVENTION OF THE DIGITAL RESISTANCE TO THE VIOLENCE AGAINST BLACK TRANSGENDER WOMEN

ON AUGUST 17, 2020, EDEN ESTRADA, JASLENE BUSANET, AND JOSLYN ALLEN, THREE TRANSGENDER WOMEN OF COLOR, EXPERIENCED A VIOLENT ASSAULT IN WEST HOLLYWOOD, CALIFORNIA. A GROUP OF REPORTEDLY FIVE OR MORE CISGENDER MEN OF COLOR HARASSED THE THREE WOMEN, INJURED THEM, AND FILMED THE ATTACK. AFTER THE ASSAULT VIDEO WENT "VIRAL" ON SOCIAL MEDIA, AN UPSURGE OF SUPPORT FOR BOTH, THE SURVIVORS AND THE TRANSGENDER COMMUNITY AS A WHOLE, AROSE WITHIN PUBLIC CONVERSATIONS ABOUT ANTI-TRANSGENDER VIOLENCE ON TWITTER. BY DOCUMENTING THE EMERGING TWITTER DISCOURSE FROM AUGUST 17 TO 21, MY PAPER IMPLEMENTS A QUALITATIVE CONTENT ANALYSIS OF SAMPLED TWITTER THREADS FOLLOWING THE ASSAULT AS MEANS TO ILLUSTRATE HOW SOCIAL MEDIA AUDIENCES HAVE CONCEPTUALIZED JUSTICE FOR THE TRANSGENDER COMMUNITY. THROUGH BUILDING AND CONNECTING LITERATURE FROM CRITICAL QUEER THEORY, MEDIA STUDIES, AND BLACK FEMINIST THOUGHT, I SITUATE SOCIAL MEDIA DISCOURSE REGARDING ANTI-TRANSGENDER VIOLENCE AS NOT ONLY A MEDIUM FOR THE MASS RECIRCULATION OF TRAUMA PORN, BUT ALSO A PRODUCER OF CARCERAL LOGICS AND BLACK TRANSGENDER ERASUER. IN MY INTERVENTION OF DIGITAL CONVERSATIONS CONCERNING VIOLENCE AGAINST BLACK TRANS WOMEN, I CONTEND THAT THE CONTEMPORARY #TRANSLIVESMATTER DISCOURSE IS NOT ONLY INADEQUATELY ADDRESSING THE INTERSECTION OF RACE, BUT IS ULTIMATELY HARMING THE COMMUNITIES IN WHICH THEY ARE SUPPOSEDLY FIGHTING FOR.

PURNIMA QAMAR, PSYCHOLOGY

FACULTY MENTOR(S): KALINA MICHALSKA

PRE-PANDEMIC EMPATHY LONGITUDINALLY PREDICTS LATINA GIRLS' ALTRUISTIC GIVING BEHAVIOR DURING COVID-19

EMPATHIC ADULTS ENGAGE IN HIGHER LEVELS OF PROSOCIAL BEHAVIOR, INCLUDING CHARITABLE DONATION (SMITH ET AL., 2020), BUT LESS IS KNOWN ABOUT THIS ASSOCIATION DEVELOPMENTALLY (PROT ET AL., 2014) AND IN NATURALISTIC CONTEXTS, SUCH AS THE COVID-19 PANDEMIC. IN THE CURRENT STUDY, WE TESTED HOW THREE FACETS OF PRE-PANDEMIC EMPATHY INFLUENCED ALTRUISTIC SHARING BEHAVIOR DURING THE PANDEMIC IN LATINA GIRLS.

IN A SAMPLE OF 33 GIRLS (MAGE = 10.2 YEARS + 0.34, 100% LATINA BY SELF-IDENTIFICATION), CHILDREN'S AFFECTIVE EMPATHY, COGNITIVE EMPATHY, AND INTENTION TO COMFORT WERE MEASURED VIA THE SELF-REPORTED EMPATHY QUESTIONNAIRE FOR CHILDREN AND ADOLESCENTS (EMQUE-CA). APPROXIMATELY ONE YEAR LATER (MTIME = 1.2 YEARS + 0.1), ALTRUISTIC GIVING BEHAVIOR DURING THE COVID-19 PANDEMIC WAS MEASURED VIRTUALLY VIA A PROSOCIAL TASK WHEREBY CHILDREN WERE GIVEN THE OPPORTUNITY TO DONATE ANY PORTION OF THEIR \$20 STUDY EARNINGS TO AN UNKNOWN CHILD WHO WAS OSTENSIBLY INFECTED WITH COVID-19 (MDONATION = \$8.14 + \$0.9).

WE CONDUCTED THREE LINEAR REGRESSIONS. IN EACH MODEL, ONE EMPATHY SUBSCALE PREDICTED DOLLARS DONATED TO THE SICK CHILD, CONTROLLING FOR HOUSEHOLD INCOME. ALTRUISTIC GIVING WAS PREDICTED BY AFFECTIVE EMPATHY ($p = 0.049$) BUT NOT COGNITIVE EMPATHY OR INTENTION TO COMFORT ($ps > 0.829$).

OUR FINDINGS POINT TO THE IMPORTANCE OF SHARED DISTRESS AS A CATALYST OF ALTRUISTIC BEHAVIOR IN AN UNDERSTUDIED SAMPLE OF LATINA GIRLS. THIS WORK HAS IMPLICATIONS FOR EDUCATIONAL STRATEGIES FOCUSED ON PROMOTING AFFECTIVE EMPATHY TO FACILITATE CHILDREN'S PROSOCIAL BEHAVIOR AND POSSIBLY REDUCE SELF-CENTERED BEHAVIORS.

DIANA RAMIREZ DIAZ, HISTORY

FACULTY MENTOR(S): GEORG MICHELS

HOW RUSSIAN WOMEN UTILIZED ORGANIZATIONAL POWER DURING THE REVOLUTION OF 1917

THE PURPOSE OF MY RESEARCH WAS TO UNCOVER AND UNDERSTAND HOW WOMEN DURING THE RUSSIAN REVOLUTION OF 1917 WERE ABLE TO GAIN RIGHTS IN SIGNIFICANT SECTORS OF SOCIETY. I FOCUSED ON THE WORKFORCE, EDUCATION, POLITICS, AND LEADERSHIP. DURING MY RESEARCH I DISCOVERED THAT THE USE OF ORGANIZATIONAL POWER WAS VITAL: SPEARHEADED BY THE REVOLUTION OF 1917, RUSSIAN WOMEN WERE ABLE TO BREAK BARRIERS THAT HAD LONG BEEN PUT IN PLACE BY THE IMPERIAL REGIME. THROUGH ANALYSIS OF PRIMARY SOURCES THAT INCLUDED LETTERS AND FIRST-HAND ACCOUNTS, I EXPLORED HOW RUSSIAN WOMEN WERE ABLE TO USE ORGANIZATIONAL POWER AND HAVE THEIR VOICES HEARD. THEY WERE NOW RECOGNIZED AS IMPORTANT CITIZENS OF RUSSIAN SOCIETY. WOMEN REALIZED THAT THIS WAS THE TIME AND THEIR OPPORTUNITY TO BE HEARD AND SEEN. THEY JOINED AND FORMED MANY ORGANIZATIONS DURING THOSE REVOLUTIONARY YEARS.

IT IS IMPORTANT TO CONTINUE THE RESEARCH OF WOMEN DURING THE REVOLUTION OF 1917. THERE IS ONLY A VERY LIMITED NUMBER OF HISTORICAL STUDIES WRITTEN ABOUT THE LIVES OF WOMEN DURING THE RUSSIAN REVOLUTION. BUT ONE MUST NOT FORGET THAT RUSSIA WAS ONE OF THE FIRST COUNTRIES TO ALLOW WOMEN TO VOTE. THE STRUGGLES OF PEASANT, LOWER CLASS AND MINORITY WOMEN ARE STILL MUCH UNKNOWN IN HISTORY. THESE HISTORIES OFFER RICH KNOWLEDGE AND PERSPECTIVES OF THE RUSSIAN REVOLUTION AND WOMEN'S HISTORY.

MARIO RANGEL, ENGLISH

FACULTY MENTOR(S): COURTNEY BAKER

INTERROGATING MEXICAN AND MEXICAN-AMERICAN REPRESENTATION IN THE WORLD OF HOLLYWOOD CINEMA

MY RESEARCH EXAMINES HOW HOLLYWOOD'S CINEMATIC PORTRAYALS OF MEXICANS AND MEXICAN-AMERICANS ACTIVELY WORK TO CONFINE THE MEXICAN AND MEXICAN-AMERICAN IMAGE TO STEREOTYPICAL REPRESENTATIONS. MY RESEARCH EXPLORES HOW THESE PORTRAYALS HAVE THE DETRIMENTAL POTENTIAL TO NARROW MEXICAN AND MEXICAN-AMERICAN IDENTITY FROM BEING ABLE TO HAVE VARIOUS REPRESENTATIONS. IN ORDER TO ANALYZE HOW THESE REPRESENTATIONS CONSTRICT THE MEXICAN AND MEXICAN-AMERICAN IMAGE. I WILL BE WATCHING AND ANALYZING TWO FILMS-SICARIO, AN ACTION/THRILLER FILM DIRECTED BY DENIS VILLENEUVE. THE FILM'S PLOT REVOLVES AROUND FBI AGENT KATE MACER WHO JOINS A TASK FORCE LED BY THE MYSTERIOUS AND SHADOWY CHARACTERS MATT GRAVER AND ALEJANDRO. AND THE FILM END OF WATCH, AN ACTION/CRIME FILM DIRECTED BY DAVID AYER. THE PLOT OF THE FILM FOCUSES ON LONGTIME LAPD PARTNERS BRIAN TAYLOR AND MIKE ZAVALA AS THEY PATROL ONE OF THE MOST DANGEROUS ROUTES IN LA. WHILE EXAMINING THESE FILMS I WILL BE BUILDING UPON FILM SCHOLAR JOHN COWAN'S DEFINITION OF THE ETHNIC AVENGER WHICH IS DEFINED AS "A MALE ACTION HERO THAT PURSUES THE PERPETRATOR AT LENGTH (WITH DELAYED GRATIFICATION) BEFORE FINALLY EXACTING RIGHTEOUS VENGEANCE."(COWAN'S 34). AND I WILL ALSO BE BUILDING UPON SCHOLARS LINDSAY PEREZ AND DANIEL G. SOLORZANO'S DEFINITION OF THE MEXICAN BANDIT WHICH IS DEFINED AS A "MULTI-MODEL TEXT THAT INCLUDES WORDS AND IMAGES MEANT TO COMMUNICATE PARTICULAR MESSAGES"(PEREZ AND SOLORZANO 230). IN ORDER TO PUT THESE STEREOTYPES INTO THE CONTEXT OF 21ST-CENTURY FILM AND RACE STUDIES. SO THAT WE MAY UNDERSTAND HOW POPULAR PORTRAYALS LIMIT MEXICAN AND MEXICAN-AMERICAN REPRESENTATION.

NICOLAS RIOS, LIBERAL STUDIES, MARKETING MINOR

FACULTY MENTOR(S): SEAN JASSO

HOW TO KEEP PEPSI'S BRAND FROM GOING FLAT

WHILE THE FORTUNE 500 COMPANY, PEPSICO, OWNS MANY SNACK AND BEVERAGE BRANDS, SUCH AS FRITO LAY AND TROPICANA, ONE OF THEIR MOST WIDELY RECOGNIZED BRANDS IS PEPSI. PEPSI IS ONE OF PEPSICO'S MAIN ENTRIES INTO THE CARBONATED SOFT DRINK MARKET, WHICH THEY ARE A MAJOR FIGURE IN. SOME OF THEIR COMPETITORS IN THE MARKET ARE COCA COLA AND KEURIG DR PEPPER. CARBONATED SOFT DRINKS ARE BEVERAGES MADE WITH CARBONATED WATER, WHICH IS THEN GIVEN FLAVORING WITH OTHER INGREDIENTS AND CHEMICALS. IN RECENT YEARS, THE PURCHASE AND CONSUMPTION OF CARBONATED SOFT DRINKS HAS DECLINED AS THE ADVERSE HEALTH EFFECTS OF SUGARY BEVERAGES BECOME MORE PUBLICIZED AND CONSUMERS BECOME MORE HEALTH CONSCIOUS. MANY CONSUMERS ARE STARTING TO LIMIT, OR COMPLETELY CEASE, THEIR CONSUMPTION OF CARBONATED SOFT DRINKS AND SEEK HEALTHIER ALTERNATIVES. THIS SHIFT IN CONSUMER PERCEPTION AND HABITS POSES A THREAT TO THE SALES OF ALL PRODUCTS IN THE CARBONATED SOFT DRINK MARKET, INCLUDING PEPSI. TO MEET ITS CONSUMER'S CHANGING WANTS AND NEEDS, PEPSICO OFFERS DIET AND ZERO SUGAR VARIETIES OF PEPSI. IT ALSO OFFERS PEPSI MAX, WHICH HAS NO SUGAR AND A LOW-CALORIE COUNT. THIS PRESENTATION WILL PROVIDE AN OVERVIEW OF THE MARKET CONDITIONS PEPSICO FACES IN SNACK AND BEVERAGE INDUSTRY AND A LOOK AT PEPSI AS A PRODUCT AND ITS PLACE IN THE MARKET. IT WILL ALSO FEATURE AN INVENTORY ON COMPETITORS IN THE MARKET, AN ANALYSIS OF THE FACTORS HELPING AND HURTING PEPSI AS A BRAND, AND A PROPOSAL FOR HOW PEPSICO CAN STRENGTHEN ITS BRAND IN THE MARKET.

ETHAN ROESLER, HISTORY & CREATIVE WRITING

FACULTY MENTOR(S): GEORG MICHELS

U.S. IMPERIALISM'S AFTERSHOCKS: THE CONSEQUENCES OF HISTORIC INTERGENERATIONAL TRAUMA FOR AMERICAN SAMOANS

THIS RESEARCH UNEARTHS AND CONTEXTUALIZES THE LEGACY OF AMERICA'S ONGOING IMPERIALIST RELATIONSHIP WITH AMERICAN SAMOA. IT CHALLENGES HISTORICAL MISREPRESENTATIONS THAT FAIL TO EXPLAIN WHY SAMOAN-AMERICANS REMAIN LEGALLY UNPROTECTED, INVISIBLE, AND VOICELESS ACROSS THE UNITED STATES. IT WAS ACCOMPLISHED VIA ANALYZING HISTORICAL DOCUMENTS, RECORDS, LETTERS, AND PAST STUDIES, WHILE SIMULTANEOUSLY FORMING RELATIONSHIPS WITH SEVERAL LOCAL SAMOAN-AMERICAN COMMUNITY LEADERS IN CALIFORNIA WHO WERE INTERVIEWED. THIS REVEALED NUMEROUS SUBSTANTIAL, PERTINENT EFFECTS OF AMERICA'S FOREIGN INTERFERENCE IN AMERICAN SAMOA, NAMELY BEING SAMOAN RESETTLEMENT ACROSS THE MAINLAND UNITED STATES IN NOTABLE MAGNITUDE DURING THE 1950S AND CONSISTENTLY THEREAFTER. CONSEQUENTLY, MORE SAMOANS ARE LIVING IN CALIFORNIA CURRENTLY THAN THERE ARE IN AMERICAN SAMOA. MY RESEARCH REVEALS THAT THE INJUSTICES AMERICAN SAMOANS FACED THROUGHOUT THE PAST HALF-CENTURY HAVE NOT SIGNIFICANTLY CHANGED NOR IMPROVED. THIS IS DUE TO PARALYZING COMPLACENCY THAT IS ROOTED IN FEARFUL INSECURITY, CONFINING THEM TO THEIR SUBSTANDARD STATUS QUO THAT IS ENFORCED VIA SOCIOECONOMIC AND SOCIOPOLITICAL DISENFRANCHISEMENT BY THE U.S. GOVERNMENT. HENCE, THE DIRECT CONSEQUENCE OF THIS HAS BEEN HISTORIC INTERGENERATIONAL TRAUMA IN THE AMERICAN SAMOAN COMMUNITY. IT HAS MANIFESTED AS AN INCREASING INABILITY TO SPEAK THE SAMOAN LANGUAGE, APATHETIC MISGIVINGS TOWARDS CIVIC INSTITUTIONS, RELEGATION TO LOWER ECONOMIC PROSPECTS AND OPPORTUNITIES DUE TO THEIR QUASI-AMERICAN CITIZENSHIP, UNFAMILIARITY WITH THEIR NUANCED HISTORY AND REPRESSED LEGAL STATUSES, DISCONNECT WITH THEIR HERITAGE, DISCRIMINATORY OSTRACIZATION, AND STEREOTYPING FROM BROADER AMERICAN SOCIETY. DESPITE THESE IMMENSE CHALLENGES, THE COMMUNITY HAS REMAINED STEADFAST AND HOPEFUL, FURTHER NECESSITATING THAT THIS RESEARCH GARNERS EXPOSURE TO BOLSTER AWARENESS ABOUT THEIR PLIGHT.

KELSEY ROSALES-TORRES, NEUROSCIENCE

FACULTY MENTOR(S): WENDY SALTZMAN

EFFECTS OF PARENTHOOD ON NEURAL RESPONSES TO PUP RELATED CUES

THE ONSET OF PARENTAL CARE IN FEMALE MAMMALS IS ASSOCIATED WITH PLASTICITY IN NEURAL PROCESSING OF INFANT-RELATED SENSORY STIMULI, WHICH ENHANCES MOTHERS' ABILITY TO DETECT AND CARE FOR THEIR OFFSPRING; HOWEVER, LITTLE IS KNOWN ABOUT SENSORY PLASTICITY IN FATHERS. WE TESTED THE HYPOTHESIS THAT PARENTHOOD ALTERS NEURAL RESPONSES TO OLFACTORY AND AUDITORY STIMULI FROM INFANTS IN MALE AND FEMALE CALIFORNIA MICE (*PEROMYSCUS CALIFORNICUS*), A BIPARENTAL RODENT. VIRGINS AND NEW PARENTS OF BOTH SEXES WERE EXPOSED TO A COMBINATION OF A CHEMOSENSORY STIMULUS (PUP-SCENTED OR UNSCENTED COTTON [CONTROL]) AND AN AUDITORY STIMULUS (PUP VOCALIZATIONS OR WHITE NOISE [CONTROL]). BRAINS WERE COLLECTED ONE HOUR LATER AND STAINED IMMUNOHISTOCHEMICALLY FOR FOS, AN INDEX OF NEURAL ACTIVITY. WE QUANTIFIED FOS IN THE MAIN OLFACTORY BULB (MOB), A REGION ESSENTIAL TO RECEIVING OLFACTORY INFORMATION, AND MEDIAL PREOPTIC AREA (MPOA), A REGION CRITICAL FOR PARENTAL BEHAVIOR. WE PREDICTED THAT FOS IN MOB AND MPOA WOULD BE GREATER IN PARENTS THAN VIRGINS, ESPECIALLY AFTER EXPOSURE TO PUP STIMULI. WE FOUND THAT IN FEMALES, MPOA AND MOB FOS DID NOT DIFFER BETWEEN VIRGINS AND MOTHERS OR ACROSS TREATMENT GROUPS. IN CONTRAST, FATHERS HAD LOWER EXPRESSION OF FOS IN MOB BUT HIGHER EXPRESSION IN MPOA, COMPARED TO VIRGIN MALES. MOREOVER, FOS IN MPOA WAS HIGHER IN MALES EXPOSED TO PUP VOCALIZATIONS AND ODOR COMPARED TO THOSE EXPOSED EXCLUSIVELY TO PUP VOCALIZATIONS. THESE FINDINGS SUGGEST THAT ONSET OF PARENTHOOD ALTERS RESPONSIVENESS OF THE MOB AND MPOA TO PUP VOCALIZATIONS AND ODORS IN MALES BUT NOT FEMALES IN THIS BIPARENTAL RODENT.

JESSICA RUIZ VEGA, SOCIOLOGY

FACULTY MENTOR(S): VICTORIA REYES

UNDOCUMENTED MEXICAN ADOLESCENTS AND THEIR RELATIONSHIP WITH THEIR ETHNIC AND CULTURAL IDENTITIES IN RELATION TO RESOURCE PROGRAMS AT UCR

I PLAN TO INVESTIGATE THE WAYS IN WHICH MEXICAN-BORN UNDOCUMENTED STUDENTS ACCESS RESOURCES ON THEIR UNIVERSITY CAMPUS. UNDOCUMENTED ADOLESCENTS WHO WERE BORN IN MEXICO, BUT GREW UP IN THE UNITED STATES AND BELONG TO THE 1.5 GENERATION BUT HAVE SINCE BEEN SOCIALIZED TO LIVE THE CHICANO EXPERIENCE, FIND THEMSELVES TORN WHEN TRYING TO FIND A WAY TO CONNECT THEMSELVES TO RESOURCES THAT WOULD BEST CATER TO THEIR IDENTITIES IN HIGHER EDUCATION. I WILL DO SO BY INTERVIEWING TEN TO TWENTY MEXICAN-BORN UNDOCUMENTED STUDENTS AT THE UNIVERSITY OF CALIFORNIA RIVERSIDE, ASKING QUESTIONS RELATED TO THEIR RACIAL-ETHNIC IDENTIFICATION AND HOW THAT SHAPES WHAT RESOURCES THEY USE ON CAMPUS. I HYPOTHESIZE THAT THESE STUDENTS DO NOT IDENTIFY AS CHICANO, DESPITE SHARED LIVED EXPERIENCES BECAUSE THEY DO NOT HAVE THE CITIZENSHIP STATUS TO SHOW THEY ARE ALSO FROM THE UNITED STATES AND THEREFORE ARE NOT ABLE TO COMFORTABLY ACCESS RESOURCES PROVIDED BY THE CHICANO STUDENT SERVICES THEREFORE LIMITING THEM TO ONLY THE UNDOCUMENTED STUDENT CENTER. THIS CREATES A CLEAR DISADVANTAGE FOR UNDOCUMENTED STUDENTS BECAUSE THEY ARE UNABLE TO CONNECT WITH THOSE WHO ARE FROM SIMILAR BACKGROUNDS AND PREVENTS THEM FROM PARTICIPATING IN CULTURAL ACTIVITIES, WHICH IS IMPORTANT BECAUSE IT SHOWS STUDENTS FEEL COMFORTABLE AND SUPPORTED IN HIGHER EDUCATION THEREFORE ALLOWING THEM THE SPACE TO FEEL UPLIFTED AND FLOURISH. THIS RESEARCH IS SIGNIFICANT BECAUSE IT PROVIDES INSIGHT ON HOW TO BETTER SUPPORT UNDOCUMENTED STUDENTS IN HIGHER EDUCATION.

GREGORY SANCHEZ, HISTORY

FACULTY MENTOR(S): ALEJANDRA DUBCOVSKY

THE BROWN CITRUS BELT: A LATINX HISTORY OF THE INLAND EMPIRE IN THE 20TH CENTURY

THIS RESEARCH EXPLORES THE COMPLEX HISTORY OF THE LATINX COMMUNITY IN THE INLAND EMPIRE. CENTERING THE EXPERIENCES OF LATINX'S IN SOUTHERN CALIFORNIA'S SAN BERNARDINO COUNTY, I OFFER A RETELLING OF INLAND EMPIRE HISTORY. USING MATERIALS FROM BOTH UC RIVERSIDE AND CAL STATE SAN BERNARDINO SPECIAL COLLECTIONS, I PRESENT A STORY OF LATINX ADAPTABILITY, SURVIVAL, AND FIDELITY TO A REGION THAT HAS REPEATEDLY SOUGHT TO REMOVE LATINX'S FROM ITS ROMANTICIZED ORIGIN STORY. THIS PROJECT INSERTS AN ANALYSIS OF RACE INTO THE CITRUS BELT'S "ANGLO FANTASY PAST," EXPLORING THE LEGACIES AND FUTURES OF LATINX RESIDENTS IN THE INLAND EMPIRE. IN THIS WORK, ORAL HISTORIES ARE USED TO ILLUSTRATE THE EXPERIENCES OF THE SEGREGATED MEXICAN AMERICAN COMMUNITY OF COLTON, CALIFORNIA DURING THE MID-20TH CENTURY TO PROVIDE CONTEXT OF LIVED EXPERIENCES IN A REGION IMMERSSED IN A LEGACY OF WHITE "SELECTIVE TRADITION" MAKING. BY THE 1980'S, THE INLAND EMPIRE HISPANIC NEWS EMERGED, AND IT IS THROUGH THIS COMMUNITY CIRCULATION, ONE THAT BEGAN IN RESPONSE TO A NEGLECT OF LATINX REPRESENTATION IN EXISTING INLAND EMPIRE NEWSPAPERS, THAT I ARGUE THAT THROUGHOUT HISTORY'S MANY SOCIAL, POLITICAL, AND ECONOMIC STRAINS IN THE REGION, THE LATINX PRESENCE IN THE INLAND EMPIRE HAS EFFECTIVELY MAINTAINED ITS VALIDATION IN THE REGION THROUGH COMMUNITY FORMATION, CULTURAL ACHIEVEMENTS, ADVOCACY, EDUCATION, AND AWARENESS. THIS LATINX HISTORY OF THE INLAND EMPIRE PROVIDES A RICHER, MORE NUANCED, AND DECOLONIZED HISTORY OF SOUTHERN CALIFORNIA'S CITRUS BELT, AND MOVES OUT OF THE SHADOWS THE LATINX ACTORS OFTEN DISREGARDED BY CONVENTIONAL NARRATIONS OF THE REGION'S ORIGINS.

CHHAVI SHUKLA, PSYCHOLOGY

FACULTY MENTOR(S): ANUBHUTI GOEL

AN ASSAY TO STUDY SUSCEPTIBILITY TO DISTRACTORS IN A MOUSE MODEL OF FRAGILE X SYNDROME

FRAGILE X SYNDROME (FXS), IS THE MOST COMMON INHERITED FORM OF MENTAL IMPAIRMENT ASSOCIATED WITH LEARNING DISABILITIES, COGNITIVE IMPAIRMENT, AND DEFICITS IN SOCIAL INTERACTION. HOWEVER, THE MECHANISMS THROUGH WHICH SENSORY ABNORMALITIES INFLUENCE A GOAL-DIRECTED TASK AND SOCIAL INTERACTIONS IS LARGELY UNKNOWN. TO ADDRESS THIS, WE DESIGNED A GOAL-DIRECTED TASK IN A WELL-STUDIED MOUSE MODEL OF FXS - FMR1 KNOCKOUT (FMR1-/-) MICE. MICE LEARNED A VISUAL DISCRIMINATION TASK CONSISTING OF SINUSOIDAL GRATINGS DRIFTING IN TWO ORTHOGONAL ORIENTATIONS. FMR1-/- MICE EXHIBITED DELAYED LEARNING AND SUSCEPTIBILITY TO DISTRACTING AUDITORY AND VISUAL STIMULI, INDICATING HYPERSENSITIVITY AND INABILITY TO TUNE OUT DISTRACTORS. THIS ASSAY PROVIDES A VALUABLE TOOL TO STUDY SENSORY HYPERSENSITIVITY IN THE CONTEXT OF FXS.

RASNEEK SINGH, PSYCHOLOGY AND PUBLIC POLICY

FACULTY MENTOR(S): REBEKAH RICHERT

EXAMINING THE RELATIONSHIP BETWEEN CHILDREN'S PERCEPTIONS OF GOD AND MORAL REASONING

PAST RESEARCH INDICATES THAT PRESCHOOL AGED CHILDREN ARE ABLE TO DIFFERENTIATE SOCIAL TRANSGRESSIONS INTO 4 DISTINCT CATEGORIES: MORAL, PRUDENTIAL, CONVENTIONAL, AND PRAGMATIC (TISAK ET AL., 1996) AND FOUND THAT CHILDREN ALSO TEND TO RATE MORAL TRANSGRESSIONS AS MORE SERIOUS OFFENSES THAN PRAGMATIC OR CONVENTIONAL TRANSGRESSIONS (DAHL & KIM, 2014). THE CURRENT STUDY EXAMINES THE INFLUENCE CHILDREN'S PERCEPTIONS OF GOD MAY PLAY ON CHILDREN'S DISCRIMINATION AND JUDGMENT OF SOCIAL TRANSGRESSIONS.

79 CHILDREN BETWEEN THE AGES OF 6-10 (M AGE = 8.39; 58.2% FEMALE; 56.96% CHRISTIAN DENOMINATIONS, 16.46% ISLAM, 21.52% NON-RELIGIOUS, AND 5.06% OTHER) WERE PRESENTED WITH VARIOUS VIGNETTES DEPICTING SOCIAL WRONGDOINGS ACROSS THE FOUR TYPES OF TRANSGRESSIONS. TO DETERMINE IF CHILDREN DIFFERENTIATE BETWEEN SOCIAL TRANSGRESSIONS, PARTICIPANTS WERE TASKED WITH ASSIGNING AN APPROVAL RATING RANGING FROM -2 (REALLY DIDN'T LIKE) TO 2 (REALLY LIKED) FOR EACH VIGNETTE. ADDITIONALLY, CHILDREN WERE ASKED IF THEY EITHER DID (1 = YES) OR DID NOT (0 = NO) BELIEVE GOD DEMONSTRATED BOTH POSITIVE (HELP, COMFORT, LOVE) AND NEGATIVE (PUNISH, ANGRY, SCARE) EMOTIONAL STATES. RESULTS INDICATED THAT THERE WAS A SIGNIFICANT RELATIONSHIP BETWEEN CHILDREN'S MORAL REASONING AND CHILDREN'S POSITIVE VIEWS OF GOD, $F(3, 73) = 3.485$, $p = .020$. CHILDREN THAT ARE MORE LIKELY TO VIEW GOD AS A HELPFUL, CARING, AND LOVING BEING TEND TO ASSIGN A LOWER APPROVAL RATING FOR MORAL TRANSGRESSIONS.

PREETI SIVAKUMAR, PSYCHOLOGY

FACULTY MENTOR(S): REBEKAH RICHERT

THE MAGIC OF MEMORY - AN ILLUSTRATED SUPPLEMENTAL GUIDE

LEARNING COMPLEX TOPICS SUCH AS COGNITION, CHEMISTRY, OR BIOLOGY, CAN BE DIFFICULT FOR STUDENTS OF ALL AGES. VISUALIZATIONS CAN HELP PORTRAY CHALLENGING MATERIAL IN A MORE CLEAR AND CONCISE MANNER WHILE HELPING STUDENTS MAKE INFERENCES AND DEVELOP A DEEPER UNDERSTANDING. ONE OF THE MAJOR ARGUMENTS FOR USING VISUAL AIDS IN LEARNING ENVIRONMENTS IS THAT

INDIVIDUALS ARE ABLE TO IDENTIFY GAPS IN THEIR KNOWLEDGE AND MAKE INFERENCES. THE BOOK CONSISTS OF THREE MAIN CHAPTERS, RESPECTIVELY TITLED SHORT TERM MEMORY, WORKING MEMORY, AND LONG TERM MEMORY, INCLUDING A BONUS CHAPTER AT THE END TITLED STUDYING WITH THE MAGIC OF MEMORY. THE BONUS SECTION IS INTENDED TO BE A "SUMMARY" OF ALL THREE CHAPTERS THAT UTILIZES THE SCIENCE OF MEMORY TO DISCUSS EFFECTIVE STUDY TIPS STUDENTS CAN USE TO IMPROVE THEIR KNOWLEDGE RETENTION, ACADEMIC HABITS, AND MEMORIZATION SKILLS. EACH CHAPTER IS DIVIDED INTO MINI SECTIONS THAT SHOW THE READER A SHORT COMIC STRIP ABOUT THE SUBTOPIC IN A WAY THAT IS EASY TO UNDERSTAND, FOLLOWED BY A MORE IN-DEPTH TEXT EXPLANATION. THE COMIC STRIPS FEATURE TWO MAIN CHARACTERS, ANJANA AND JI-HOON, WHO ARE MIDDLE SCHOOLERS LEARNING ABOUT MEMORY. THE TWO FRIENDS GUIDE THE READER THROUGH THE BOOK, PICKING APART SUBTOPICS THAT TEND TO BE CHALLENGING WHEN PRESENTED SOLELY THROUGH TEXT. THE PURPOSES OF THIS HIGH-SCHOOL-LEVEL ILLUSTRATED SUPPLEMENTAL GUIDE ARE TO ALLOW STUDENTS TO LEARN ABOUT THE BASICS OF MEMORY IN A WAY THAT IS PALATABLE AND TO BRIDGE THE GAP BETWEEN ACADEMIC TEXTS AND THE GENERAL PUBLIC.

DAISY SOTO, SPANISH, LINGUISTICS CONCENTRATION

YANAI SALGADO, SPANISH, SOCIOLOGY, COMMUNICATION

FACULTY MENTOR(S): COVADONGA LAMAR- PRIETO

SITUATING TOMAS RIVERA'S LIFE THROUGH TRANSCRIPTIONS: AN ANALYSIS OF LANGUAGE USE AND ITS CONNECTION TO THE BILINGUAL EXPERIENCE IN CALIFORNIA/UNITED STATES

TOMÁS RIVERA'S LIFE TRAJECTORY REPRESENTS ONE THAT MANY SPANISH-SPEAKING BILINGUAL LATINX INDIVIDUALS CAN IDENTIFY WITH. BEFORE BECOMING UC RIVERSIDE'S FIRST LATINO CHANCELLOR, RIVERA HAD TRAVERSED LIFE AS A FARM WORKER, SIMULTANEOUSLY IMMERSING HIMSELF IN ACADEMIA, AND CEMENTING HIMSELF AS A CHICANO WRITER WHO CURATED STORIES THAT SPOKE TO THE EXPERIENCES OF FELLOW CHICANX AUDIENCES. ONE OF THE KEY FEATURES OF RIVERA'S WORKS IS THAT HE EMPLOYED LANGUAGE THAT WAS ACCESSIBLE TO READERS WITH DIVERSE LINGUISTIC BACKGROUNDS. AS SUCH, HIS WORKS WERE AND REMAIN AUTHENTIC TO THE LINGUISTIC EXPERIENCES OF MANY FIRST AND SECOND-GENERATION INDIVIDUALS SUCH AS HIMSELF WHO WERE BORN AND RAISED IN THE UNITED STATES TO MIGRANT WORKERS.

BY TRANSCRIBING AND EXAMINING PREVIOUSLY DIGITIZED MANUSCRIPTS OF TOMÁS RIVERA'S WORKS, OUR PROJECT AIMS TO NOTE THE PARALLELS BETWEEN RIVERA'S LIFE AND THE REALITIES OF SPANISH-ENGLISH BILINGUAL COMMUNITIES IN CALIFORNIA/UNITED STATES. THROUGH HIGHLIGHTING THE USE OF NONSTANDARD LANGUAGE UTILIZED IN RIVERA'S WORKS, WE AIM TO INFORM THE CONNECTION BETWEEN LANGUAGE AND SOCIAL CLASS. WE WILL ANALYZE THE SOCIAL CONTEXT IN WHICH NONSTANDARD LEXICAL ITEMS SUCH AS "FIJISE", "NOMÁS", ETC ARE USED IN ORDER TO GAUGE LANGUAGE DIFFERENCES BETWEEN THE DISTINCT SOCIO ECONOMIC BACKGROUNDS OF RIVERA'S LIFE AND THAT OF BILINGUAL COMMUNITIES IN CALIFORNIA/UNITED STATES. IN DOING SO, WE HOPE TO LEGITIMIZE THE RICH CULTURE AND SOCIAL MOBILITY OF A COMMUNITY WHOSE IDENTITY HAS OFTEN BEEN STEREOTYPED AS MONOLITHIC AND WHOSE USE OF SPANISH HAS OFTEN BEEN MARGINALIZED.

ISABELLE SWANSON, PSYCHOLOGY

FACULTY MENTOR(S): JENNIFER SYVERTSEN

ONE HEALTH, COMMUNITY ENGAGEMENT, AND PRAXIS: SHIFTING THE HEALTH EQUITY PARADIGM

SOUTHERN CALIFORNIA IS COMMONLY KNOWN FOR ITS DIVERSITY, BEACHES, SUNNY WEATHER, AND ACTIVE LIFESTYLE. SUCH REPRESENTATIONS IN POPULAR MEDIA PAINT THIS REGION AS ONE BEAMING WITH HEALTH AND WELL-BEING. HOWEVER, THE DREAMY CALIFORNIA LIFE IS WELL OUT OF REACH FOR MANY LIVING IN THE INLAND AREAS. THE INLAND EMPIRE (IE) IS A PRIME EXAMPLE OF THE REGION'S DISPROPORTIONATE HEALTH DISPARITIES. THERE IS A CLEAR DISCONNECT BETWEEN THE HEALTH NEEDS OF IE RESIDENTS AND THE HEALTH RESOURCES TO WHICH THEY HAVE ACCESS. HEALTH IS A CORNERSTONE OF LIFE; A BASIC NEED THAT HAS BEEN TURNED INTO A

COMMODITY VIA EXORBITANT HEALTHCARE AND INSURANCE COSTS, PRIVATIZED HEALTH KNOWLEDGE, LACK OF REPRESENTATION IN HEALTH RESEARCH AND POLICY, EXPLOITATIVE LABOR PRACTICES, ECOLOGICAL DEGRADATION, AS WELL AS INTERPERSONAL AND STRUCTURAL DISCRIMINATION. SUCH HEALTH DISPARITIES ARE A STARTLING REMINDER OF THE ROLE STRUCTURAL INEQUITY PLAYS IN DETERMINING WHO DIES, WHO SURVIVES, AND WHO THRIVES. ADDITIONALLY, THE ROOTS OF OBSERVED HEALTH DISPARITIES LIE IN THE NATION'S TREATMENT OF AND ATTITUDE TOWARDS INDIGENOUS POPULATIONS AND LAND, PEOPLE OF COLOR, QUEER COMMUNITIES, WOMEN, AND OTHERS DEEMED INFERIOR BY PATRIARCHAL SOCIAL NORMS. THE ROLE OF THE CURRENT STUDY IS TO EMPLOY A ONE HEALTH LENS—THE UNDERSTANDING THAT HUMAN, ANIMAL, AND ENVIRONMENTAL HEALTH ARE DEEPLY INTERTWINED—TO CENTER THE LIVED EXPERIENCES OF HEALTH INEQUITY IN THE IE. THROUGH A REVIEW OF EXISTING LITERATURE, COMMUNITY INTERVIEWS, AND AN ARCGIS WEBPAGE, THIS PROJECT IS INTENDED TO SERVE AS A CONTRIBUTION TO THE DEVELOPMENT OF SUSTAINABLE, COMMUNITY-CENTERED STRATEGIES FOR ACHIEVING HEALTH EQUITY.

VERONICA TAPIA, SPANISH/LINGUISTIC

FACULTY MENTOR(S): COVADONGA LAMAR PRIETO

IT IS IMPORTANT FOR STUDENTS TO HAVE ACCESS TO BILINGUAL LITERATURE

MY PROJECT AIMS TO DISCOVER AND STUDY THE POEMS OF DR. TOMAS RIVERA, FORMER DIRECTOR OF THE UNIVERSITY OF CALIFORNIA RIVERSIDE. APPRECIATE AND PRESERVE MANUSCRIPTS BY TRANSCRIBING THEM TO A DIGITAL FILE. TOMÁS RIVERA WAS THE FIRST LATINO DIRECTOR OF THE UNIVERSITY OF CALIFORNIA RIVERSIDE. HIS CAREER IS A SOURCE OF INSPIRATION FOR THE LATINO COMMUNITY. IT IS IMPORTANT THAT HISPANIC CHILDREN HAVE EASY AND QUICK ACCESS TO THESE DOCUMENTS BECAUSE DR. RIVERA'S LIFE TRAJECTORY REPRESENTS AND INSPIRES THEM. THE WORK OF "TOMÁS RIVERA" WAS CARRIED OUT BY THE CLASS OF SPN 130: DIGITAL DIALECTOLOGY TAUGHT BY DR. COVADONGA LAMAR PRIETO (SOCALAB), UNIVERSITY OF CALIFORNIA RIVERSIDE DURING THE FALL QUARTER 2021. IT WAS FUNDED BY POLLIT ENDOWED CHAIR. IN CLASS THE STUDENTS WERE DIVIDED INTO DIFFERENT GROUPS WHICH WERE ASSIGNED DIFFERENT FILES TO TRANSCRIBE DIGITALLY. THESE FILES REPRESENTED DIFFERENT CHALLENGES FOR US WHEN TRANSCRIBING THEM. SOME OF THE FILES WERE VERY DIFFICULT TO READ AND WERE ALSO WRITTEN IN ENGLISH AND SPANISH. THROUGH THE TRANSCRIPTION PROCESS WE HAD THE OPPORTUNITY TO UNDERSTAND THE PROCESS OF CREATING THE POEMS. THESE ORIGINAL HANDWRITTEN DOCUMENTS SHOWED THE DIFFICULTIES THAT THE AUTHOR WENT THROUGH DURING THE CREATION OF HIS POEMS.

NATHANIEL TENG, PHILOSOPHY/LAW & SOCIETY

FACULTY MENTOR(S): CARL CRANOR

THE PRESUMPTION OF INNOCENCE: EFFECTIVENESS FOR UNDERSERVED COMMUNITIES WITHIN THE UNITED STATES CRIMINAL JUSTICE SYSTEM

THE CRIMINAL JUSTICE SYSTEM IN THE UNITED STATES IS PERCEIVED TO WORK FOR THE BENEFIT OF ALL PEOPLE REGARDLESS OF SOCIAL STATUS OR RACE/ETHNICITY. THERE ARE INDICATIONS, HOWEVER, THAT THIS IS NOT THE CASE, AND MINORITIES GOING THROUGH THE SYSTEM ARE SUBJECTED TO SEVERAL DISADVANTAGES. I AM SEEKING TO STUDY THE PRESUMPTION OF INNOCENCE TO FIND OUT THE EXTENT IN WHICH IT ENABLES THE ADMINISTRATION OF JUSTICE FOR UNDERSERVED COMMUNITIES WITHIN THE CONTEXT OF THE CRIMINAL LAW. THE PRESUMPTION OF INNOCENCE IS INTEGRAL TO A PROPER-FUNCTIONING LEGAL SYSTEM, SO THE INADEQUACY OR MALPRACTICE OF THE PRINCIPLE WOULD INDICATE DISPROPORTIONATE INJUSTICE FOR UNDERSERVED COMMUNITIES. THE CENTRAL QUESTIONS I SEEK TO ADDRESS ARE: HOW EFFECTIVE IS THE PRESUMPTION OF INNOCENCE FOR UNDERSERVED COMMUNITIES? AND WHAT EXPLAINS THE EFFECTIVENESS/LACK OF EFFECTIVENESS? I AM SEEKING TO ANSWER THESE QUESTIONS THROUGH AN EXTENDED LITERATURE REVIEW, LOOKING AT ARTICLES AND CASES IN WHICH THE MAXIM IS IMPLICATED. I ANTICIPATE THAT ALTHOUGH THE CRIMINAL JUSTICE SYSTEM HAS WRITTEN AND EXPLICIT PROTECTIONS FOR THE PRESUMPTION OF INNOCENCE, IT IS NOT ADEQUATELY PRACTICED OR ENFORCED TO A SIGNIFICANT ENOUGH DEGREE. THE RESULTS OF THIS RESEARCH COULD HELP ILLUSTRATE PROBLEMS WITHIN THE JUSTICE SYSTEM, AND HOW

THEY COULD BE ADDRESSED OR FIXED TO HELP MEDIATE THE BROADER PROBLEM OF INEQUITY FOR UNDERSERVED COMMUNITIES.

TIERNAN VAN GOSSEN, ENGLISH

FACULTY MENTOR(S): JAMES TOBIAS

WHAT IS A PLAYER?: FIGURATIONS OF AUTHORSHIP IN SINGLE-PLAYER ROLE-PLAYING VIDEOGAMES

ONE OF THE MOST WELL-KNOWN GENRES IN THE VIDEOGAMING INDUSTRY IS THE ROLE-PLAYING GAME (RPG). ITS PRIMARY FEATURE IS ALLOWING PLAYERS TO CHOOSE WHAT PATH A STORY TAKES AND SOMETIMES EVEN CREATE THEIR OWN CHARACTER IN THAT STORY. AS VIDEOGAMES HAVE BECOME A MORE PROMINENT FORM OF STORYTELLING, THIS HAS LED TO THE QUESTION OF WHO, THEN, SHOULD BE CONSIDERED THE AUTHOR OF THE GAME. SINCE THEY CHOOSE HOW THE STORYLINE PLAYS OUT, ARE PLAYERS ACTING AS THE AUTHORS OF THE STORY? IN CHAPTER FIVE OF HER BOOK *HAMLET ON THE HOLODECK: THE FUTURE OF NARRATIVE IN CYBERSPACE*, JANET H. MURRAY TACKLES THIS QUESTION WITH A QUITE SIMPLE ANSWER: NO. THE ABILITY TO MAKE CHOICES AND DRIVE GAMEPLAY IS, TO MURRAY AT LEAST, AGENCY, NOT AUTHORSHIP (188). HOWEVER, IN THE CASE OF RPGs, THE CONCEPT OF AGENCY IS NOT ENOUGH TO TRULY ARTICULATE THE POSITION OF THE PLAYER AS IT IS CRAFTED BY THE GAME DEVELOPERS AND HOW IT CONSTITUTES A FIGURATION OF AUTHORSHIP. IN MY PAPER, I USE THE *DRAGON AGE* SERIES TO ANALYZE THREE EXAMPLES OF WHAT THIS FIGURATION MAY LOOK LIKE. FURTHERMORE, THE VAST DIFFERENCES BETWEEN THE FIRST TWO INSTALLMENTS IN THE SERIES AND THE LAST ILLUSTRATE HOW THE INDIVIDUALISTIC APPROACH TO AUTHORSHIP THAT INFLUENCES ARGUMENTS LIKE MURRAY'S HAS A GROWING IMPACT ON THE WAY GAME DEVELOPERS APPROACH THE POSITION OF THE PLAYER.

RAYMOND VELASQUEZ, HISTORY

FACULTY MENTOR(S): JULIETTE LEVY

IS THERE A CORRELATION BETWEEN VIDEO GAME USAGE AND VIOLENT TENDENCIES OR AGGRESSION?

THE PURPOSE OF MY PROJECT IS TO DETERMINE WHETHER THERE IS A LINK BETWEEN VIDEO GAME USAGE AND AN INCREASE IN VIOLENT TENDENCIES IN INDIVIDUALS. I WILL BE COVERING STEREOTYPES AND COMMON MISCONCEPTIONS REGARDING THE CONSUMPTION OF VIDEO GAMES, AND HOW THEY ARE COMMONLY TIED TO VIOLENT ACTS, SUCH AS SHOOTINGS. MY RESEARCH WILL ANALYZE AND CRITIQUE THE POLITICAL, SOCIAL, AND LEGAL ARGUMENTS MADE AGAINST VIDEO GAMES IN ATTEMPTS TO BAN, CENSOR, OR LIMIT THE ACCESSIBILITY OF THEM OUT OF FEAR THAT THEY MAY HAVE REAL-LIFE CONSEQUENCES. ADDITIONALLY, I WILL CLOSELY RESEARCH THE ABUNDANCE OF STUDIES CONDUCTED ON VIDEO GAME USAGE ON THE EDUCATIONAL, PSYCHOLOGICAL, AND EMOTIONAL EFFECTS THAT CONSUMPTION OF SUCH MEDIA MAY PRODUCE. THE GOAL OF MY RESEARCH IS TO STUDY THE REASONINGS BEHIND WHY CERTAIN ORGANIZATIONS, PEOPLE, AND OUTLETS BLAME VIDEO GAMES ON VIOLENCE, AND WHAT MOTIVATING FACTORS ARE BEHIND SUCH BLAMING. BY PROVIDING EVIDENCE-BASED COUNTER ARGUMENTS TO THE CONTRARY, I BELIEVE THAT FURTHER ATTENTION AND PREVENTION CAN BE BROUGHT TO MORE GENUINE CAUSES OF VIOLENT AND AGGRESSIVE TENDENCIES IN PEOPLE FROM AN EARLY AGE.

VANESSA VERA, PSYCHOLOGY AND NEUROSCIENCE

FACULTY MENTOR(S): CECILIA AYÓN

NO SON TAN LIBRES: MOTHER'S PERCEPTION OF THE IMPACT OF IMMIGRATION POLICY ON CHILDREN

IN THE UNITED STATES DOCUMENTATION STATUS IS A STIGMATIZED IDENTITY. ANTI-IMMIGRANT RHETORIC USED BY THE TRUMP

ADMINISTRATION EXACERBATED ANTI-IMMIGRANT SENTIMENT TOWARDS THE LATINX POPULATION. THE TRUMP ADMINISTRATION ALSO ATTEMPTED TO REDUCE PROTECTIONS AFFORDED TO SOME IMMIGRANTS SUCH AS RESCINDING DACA AND ENDING TPS. IN ADDITION, TO ATTEMPTS TO REDUCE IMMIGRANTS' RIGHTS, THERE HAS BEEN AN INCREASE IN ENFORCEMENT IN THE INTERIOR AND BORDER. THESE ATTEMPTS TO FURTHER ALIENATE LATINX IMMIGRANTS HAVE HAD A NEGATIVE IMPACT ON THE WELL-BEING OF THE ENTIRE LATINX COMMUNITY. FOR INSTANCE, LATINX FAMILIES EXPERIENCE UNCERTAINTY, FEWER OPPORTUNITIES, AND MORE HARDSHIPS, PARTICULARLY MIXED STATUS FAMILIES. AT THE SAME TIME, CALIFORNIA HAS ENACTED POLICIES TO SUPPORT IMMIGRANTS IN THE INTEGRATION PROCESS WHICH HAVE GRANTED IMMIGRANTS ACCESS TO OPPORTUNITIES AND RESOURCES. GIVEN THE IMMIGRATION POLICY CONTEXT AT A FEDERAL AND LOCAL LEVEL, THIS STUDY EXAMINES IMMIGRANT MOTHER'S PERCEPTIONS ON THE IMPACT OF THE IMMIGRATION POLICY CONTEXT ON THEIR CHILDREN. THIS STUDY IS INFORMED BY IN-DEPTH INTERVIEWS WITH IMMIGRANT MOTHERS (N=30). CONSTRUCTIVIST GROUNDED THEORY WAS USED TO COMPLETE THE ANALYSIS. FINDINGS INDICATE CHILDREN HAVE A GREATER UNDERSTANDING OF THE IMMIGRATION POLICY CONTEXT THAN MOTHERS ORIGINALLY BELIEVED. MOTHERS DESCRIBED THEIR CHILDREN HAVE EXPERIENCED VARIOUS IMPACTS DUE TO THE IMMIGRATION POLICY CONTEXT INCLUDING, EMOTIONAL TOLL, A BURDEN OF RESPONSIBILITY, AND LIMITATIONS AND RESTRICTIONS TO THEIR MOBILITY AND BEHAVIOR. THE FINDINGS FROM THIS STUDY HAVE IMPLICATIONS FOR POLICY AND CAN INFORM PRACTICES MODELS THAT ARE USED WHEN WORKING WITH IMMIGRANT FAMILIES.

ZOE WARREN, PSYCHOLOGY

FACULTY MENTOR(S): ANNIE DITTA

MOTIVATION ACROSS THE COVID-19 PANDEMIC

THIS STUDY EXAMINED UNDERGRADUATE STUDENT EXPERIENCES WITH REMOTE EDUCATION DURING THE COVID-19 PANDEMIC. EARLY IN THE PANDEMIC, UNDERGRADUATE STUDENTS ANECDOTALLY REPORTED THAT THEIR MOTIVATION TO LEARN IN THE ONLINE ENVIRONMENT WAS LOW. HOWEVER, THEIR MOTIVATION MAY HAVE CONTINUED TO DECLINE AS REMOTE INSTRUCTION CONTINUED. IN TWO SURVEYS, WE INVESTIGATED THREE KEY QUESTIONS ABOUT STUDENT MOTIVATION ACROSS THE PANDEMIC: 1) HAS MOTIVATION TO LEARN DECLINED OVER THE COURSE OF REMOTE EDUCATION?, 2) WHAT FACTORS MAY BE RELATED TO SUCH A DECLINE IN MOTIVATION?, AND 3) HAS THE HYPOTHESIZED CHANGE IN MOTIVATION AFFECTED STUDENT LEARNING OUTCOMES? THE STUDY WAS CONDUCTED THROUGH ONLINE SURVEYS SENT OUT TO UNDERGRADUATE-AGED INDIVIDUALS IN THE UNITED STATES (EARLY PANDEMIC, SPRING 2020) AND UC RIVERSIDE UNDERGRADUATE STUDENTS (LATE PANDEMIC, WINTER 2022). THE SURVEYS ASKED STUDENTS TO REPORT THEIR LEVELS OF MOTIVATION, ACADEMIC PERFORMANCE, CLASS PARTICIPATION, INTERACTIONS WITH OTHER STUDENTS, AND CONNECTION TO MATERIALS AND INSTRUCTORS. WE FOUND THAT STUDENTS REPORTED SIGNIFICANTLY LOWER MOTIVATION AND HIGHER LONELINESS LATER IN THE PANDEMIC COMPARED TO EARLIER IN THE PANDEMIC. ADDITIONALLY, STUDENTS REPORTED LOW CONFIDENCE IN THE QUALITY OF SCHOOL WORK THEY PRODUCED LATE IN THE PANDEMIC (THOUGH THESE RESULTS ARE DESCRIPTIVE). THESE RESULTS ARE IMPORTANT TO UNDERSTAND HOW THE PROLONGED PERIOD OF STRESS INDUCED BY THE COVID-19 PANDEMIC INFLUENCED THE EDUCATIONAL EXPERIENCE OF UNDERGRADUATE STUDENTS.

REBEKAH WELLS, BUSINESS ECONOMICS

FACULTY MENTOR(S): BREE LANG

UNDERSTANDING HOMELESSNESS IN CALIFORNIA COMPARED TO THE UNITED STATES AS A WHOLE

IN CALIFORNIA ALONE, TAXPAYERS ARE ALLOCATING \$4.8 BILLION TO STATE HOMELESS PROGRAMS. CALIFORNIA HAS ONE OF THE HIGHEST HOMELESS POPULATIONS IN THE COUNTRY, WHICH IS OFTEN PURPORTED TO BE DUE TO THE HIGH COST OF LIVING OR DEMOCRATIC POLICIES. THIS PROJECT USES TWO SOURCES OF DATA ON HOMELESSNESS FROM THE UNITED STATES DEPARTMENT OF HOUSING AND URBAN

DEVELOPMENT BETWEEN THE YEARS 2010 AND 2019. THE FIRST IS HOMELESS POPULATION COUNTS, AND THE SECOND IS A COMPILATION OF HAND-COLLECTED DATA ON FEDERAL PROGRAM AWARDS FOR HOMELESSNESS. THESE DATA SETS ARE NORMALIZED WITH POPULATION DATA FROM THE UNITED STATES CENSUS BUREAU. I CONDUCT GRAPHICAL AND REGRESSION ANALYSIS TO ANALYZE THE RELATIONSHIP BETWEEN HOMELESSNESS AND POTENTIAL CONTRIBUTING FACTORS IN CALIFORNIA AND THE UNITED STATES AS A WHOLE. THE EXPECTED RESULT IS TO CHARACTERIZE THE TRENDS AND SEVERITY OF HOMELESSNESS IN CALIFORNIA AND HOW IT DIFFERS FROM OTHER STATES AS IT RELATES TO POLITICAL STANDING AND OTHER CORRELATING FACTORS. UNDERSTANDING THESE RELATIONSHIPS WILL HELP LAWMAKERS CREATE MORE EFFECTIVE POLICIES AND PROGRAMS INTENDED TO REDUCE HOMELESSNESS.

LIANA WILLIS, PSYCHOLOGY/LAW AND SOCIETY

FACULTY MENTOR(S): BRENT HUGHES

SOCIAL IDENTITY: PERCEPTIONS AND INFLUENCES ON TRAIT SELF-VIEWS

EVIDENCE FROM SOCIAL IDENTITY RESEARCH SHOWS THAT INDIVIDUALS WHO STRONGLY IDENTIFY WITH A SOCIAL GROUP, OR WHO BELONG TO STIGMATIZED GROUPS, ARE MORE LIKELY TO SELF-STEREOTYPE. THIS STUDY EXPLORES HOW INDIVIDUALS STRUCTURE AND RELATE THEIR VARIOUS IDENTITIES TO EACH OTHER, AND HOW PEOPLE'S FEELINGS ABOUT THEIR IDENTITIES AFFECT THE INFLUENCE THOSE IDENTITIES HAVE ON THEIR TRAIT SELF-VIEWS. WE TEST WHETHER PEOPLE SELF-EVALUATE MOST DESCRIPTIVELY ON TRAITS THEY PERCEIVE AS CHARACTERISTIC OF THEIR IDENTITIES, AND WHETHER THIS EFFECT IS MODERATED BY HOW STIGMATIZED THE IDENTITY IS, OR HOW STRONGLY IDENTIFIED THE INDIVIDUAL IS WITH IT. ACROSS EIGHT IDENTITY CATEGORIES (RACE, SEXUALITY, GENDER, RELIGION, OCCUPATION, POLITICAL BELIEFS, SOCIOECONOMIC STATUS, HOBBIES), PARTICIPANTS COMPLETED A SELF-RESPONSE QUESTIONNAIRE ABOUT WHICH IDENTITIES AND TRAITS THEY FELT CONNECTED TO, WHICH RELATED TO EACH OTHER, AND WHICH DEPEND ON EACH OTHER. A SECOND DESIGN HAD PARTICIPANTS EVALUATE EACH OF THE EIGHT IDENTITIES THEY FELT CONNECTED TO ON THEIR STRENGTH OF IDENTIFICATION WITH THEM, AND HOW STIGMATIZED THEY PERCEIVED THEM TO BE. RESULTS SHOWED THAT SEMANTIC DISTANCE OR DISSIMILARITY FROM AN IDENTITY PREDICTED LESS SELF-DESCRIPTIVE TRAIT EVALUATIONS, REFLECTING DECAY IN THE INFLUENCE OF THAT IDENTITY FOR TRAITS THAT ARE LESS SIMILAR TO STEREOTYPE-RELEVANT TRAITS. THIS DECAY IN THE INFLUENCE OF IDENTITIES ON TRAIT SELF-EVALUATIONS WAS STEEPER FOR STRONGLY IDENTIFIED OR LESS STIGMATIZED IDENTITIES, REFLECTING THAT, FOR IDENTITIES PEOPLE STRONGLY IDENTIFY WITH OR DO NOT PERCEIVE AS STIGMATIZED, INDIVIDUALS RELY MORE ON THEIR GROUP MEMBERSHIP TO INFORM SELF-VIEWS. THESE RESULTS EVIDENCE THAT SUBJECTIVE FEELINGS TOWARD IDENTITIES SHAPES SELF-VIEWS ON TRAITS.

ALEXIS ZIEMANN, PSYCHOLOGY

FACULTY MENTOR(S): AUSTIN JOHNSON

THE EFFECTS OF PERFORMANCE FEEDBACK ON OPPORTUNITIES TO RESPOND AND STUDENT ENGAGEMENT IN A HYBRID HIGH SCHOOL CLASSROOM

DUE TO THE COVID-19 PANDEMIC, REMOTE AND HYBRID LEARNING BECAME A NEW NORMAL FOR MOST STUDENTS AND SCHOOLS. HOWEVER, RESEARCH ON CHILD BEHAVIOR AND INTERVENTION EFFICACY DURING ONLINE LEARNING REMAINS SPARSE. IN AN ONLINE CLASSROOM, ENGAGING STUDENTS IS MORE CHALLENGING, EVEN WITH THE AVAILABILITY OF ONLINE ENGAGEMENT TOOLS (LIEBERMAN, 2020, RILA ET AL., 2019). UTILIZATION OF PERFORMANCE FEEDBACK (E.G., PROVIDING TEACHERS WITH DATA ABOUT THEIR IMPLEMENTATION OF AN INTERVENTION) MAY HELP TO INDIRECTLY INCREASE STUDENT ENGAGEMENT BY INCREASING TEACHER PROVISION OF OPPORTUNITIES TO RESPOND (E.G., FALLON ET AL., 2015). THE PURPOSE OF THIS STUDY WAS TO EXAMINE THE EFFICACY OF EMAIL-BASED PERFORMANCE FEEDBACK ON A HYBRID HIGH SCHOOL CLASSROOM TEACHER'S USAGE OF OPPORTUNITIES TO RESPOND. THIS STUDY UTILIZED A SINGLE CASE ABAB EXPERIMENTAL DESIGN WHERE PERFORMANCE FEEDBACK WAS ADMINISTERED TO THE TEACHER VIA EMAIL AND TEACHER OBSERVATIONS WERE CONDUCTED MEASURING THE TOTAL NUMBER OF OPPORTUNITIES TO RESPOND. OBSERVATIONS LASTED FOR

FIVE WEEKS (THREE DAYS PER PHASE) WITH ONE GOAL-SETTING INTERVENTION BETWEEN THE FIRST A AND B PHASES. RESULTS INDICATED THAT THE IMPLEMENTATION OF PERFORMANCE FEEDBACK HAD LITTLE TO NO EFFECT ON THE TEACHER'S USAGE OF OPPORTUNITIES TO RESPOND. IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH ARE DISCUSSED.

KEYWORDS: ENGAGEMENT, ONLINE LEARNING, HYBRID LEARNING, OPPORTUNITIES TO RESPOND, PERFORMANCE FEEDBACK, ABAB, SINGLE CASE

COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES

SARAH ABU HIJEH, BIOLOGY

FACULTY MENTOR(S): DJURDJICA COSS

EFFECTS OF FMR1 GENE MUTATION ON SERTOLI CELL DEVELOPMENT IN A MOUSE MODEL OF FRAGILE X SYNDROME

FRAGILE X SYNDROME (FXS) IS THE MOST COMMON CAUSE OF INTELLECTUAL DISABILITY. IT IS CAUSED BY A MUTATION OF THE FRAGILE X MENTAL RETARDATION GENE (FMR1), WHICH LEADS TO THE LACK OF ITS PROTEIN PRODUCT, FMRP. ASIDE FROM INTELLECTUAL IMPAIRMENT, AFFECTED MALES SUFFER FROM MACROORCHIDISM OR ENLARGED TESTES. GAPS EXIST IN OUR UNDERSTANDING OF WHY FXS PATIENTS HAVE MACROORCHIDISM AND WHETHER FMR1 IS IMPORTANT IN SERTOLI CELL FUNCTION AND DEVELOPMENT. TESTES ARE COMPOSED OF SEMINIFEROUS TUBULES, WHICH ARE LINED WITH SERTOLI CELLS, THAT SUPPORT THE FORMATION OF TESTES DURING DEVELOPMENT. SERTOLI CELLS ARE CRITICAL FOR SPERMATOGENESIS, FORMATION OF MATURE SPERM, AND SUPPORT OF IMMATURE GERM CELLS AND THEREFORE REPRODUCTION. WE HYPOTHEZIZE THAT MALES WITH FXS EXHIBIT MACROORCHIDISM DUE TO A HIGHER NUMBER OF SERTOLI CELLS. WE DETERMINED THAT SERTOLI CELLS EXPRESS FMRP, SUGGESTING THAT THE LACK OF FMRP MAY CONTRIBUTE TO DIFFERENCES IN SERTOLI CELL FUNCTION AND NUMBER. SPERMATOGENESIS OCCURS IN SEVERAL DISTINCT STAGES, WHICH WE WILL USE TO COMPARE NORMAL MICE (WILD-TYPE) AND ANIMALS LACKING FMR1 GENE (FMR1 KNOCKOUTS). PRELIMINARY DATA SUGGESTS A CHANGE IN SERTOLI CELL NUMBER BETWEEN KO AND WT ANIMALS VIA SOX9 LABELING. SERTOLI CELL COUNT WILL ESTABLISH IF FMR1 IS IMPORTANT FOR SERTOLI CELL DEVELOPMENT, WHILE SPERM COUNT WILL DETERMINE IF FMR1 IS IMPORTANT FOR SERTOLI CELL FUNCTION. IN CONCLUSION, OUR RESULTS WILL DETERMINE THE FUNCTION OF FMRP IN TESTES AND SERTOLI CELLS, AND THEREFORE MALE REPRODUCTIVE CAPACITY.

OLUWAMAYOWA ADESOYE, NEUROSCIENCE

FACULTY MENTOR(S): BRANDON BROWN, REGIN FIRAT

IMPACT OF COVID 19 ON UCR STUDENTS' WELLBEING AND ACADEMIC PERFORMANCE

CORONAVIRUS LED TO WORLDWIDE SHUT DOWN: SCHOOLS, WORK, CHURCHES, MOSQUES, EVERYTHING. THE VIRUS LED TO MILLIONS OF DEATHS GLOBALLY UNTIL THE VACCINES WERE INTRODUCED WHICH HELPED REDUCE THE DEATH RATE. TO EXAMINE THE EFFECTS CORONAVIRUS HAD ON THE STUDENTS AT THE UNIVERSITY OF CALIFORNIA RIVERSIDE, A SAMPLE OF 122 STUDENTS WERE TAKEN ACROSS ALL COLLEGES AND LEVELS TO UNDERSTAND HOW THIS VIRUS THAT LED TO A PANDEMIC IMPACTED THEIR MENTAL WELLBEING AND ACADEMICS. UNDER THE REQUIREMENTS SET BY UC RIVERSIDE, AN IRB APPLICATION WAS FILLED OUT TO ENSURE SAFETY AND TO MAINTAIN INTEGRITY IN RESEARCH. STUDENTS IN WHICH 60% WERE AGES 20- AND 21-YEAR-OLD DEVELOPED MENTAL DISORDERS: ANXIETY DISORDERS, PANIC DISORDERS, DEPRESSION, INSOMNIA, AND MORE WHILE OTHERS THAT ALREADY HAD THEM HAD THEIRS HEIGHTENED. THESE DISORDERS IN WHICH 72% OF THE STUDENTS SUSTAINED LED TO A DECLINE IN THEIR ACADEMICS IN WHICH 52.18% OF STUDENTS REPORTED A DECREASE IN THEIR GRADE POINT AVERAGE. STUDENTS REPORTED THAT UCR DID NOT HELP THEM ENOUGH AND COULD HAVE HELPED PREVENT THESE DISORDERS/STRESSORS BY THEIR PROFESSORS BEING MORE LENIENT, STUDENTS HAVING THE OPTION TO CONTINUE ONLINE LEARNING AS OTHER SCHOOLS PERMITTED THAT OPTION, REDUCED TUITION, AND A LONGER PERIOD OF PASS/NO PASS.

SHREYA AGRAWAL, BIOLOGY

FACULTY MENTOR(S): ILANA BENNETT

RELATIONSHIPS BETWEEN HIPPOCAMPAL MYELIN AND MEMORY PERFORMANCE IN OLDER ADULTS

GRAY MATTER IN THE BRAIN IS PRIMARILY COMPOSED OF NEURONAL CELL BODIES AND DENDRITES, BUT ALSO CONTAINS NEURONS AND IS INNERVATED BY LONG-RANGE AXONS, BOTH OF WHICH MAY BE PROTECTED BY FATTY GLIAL CELLS KNOWN AS MYELIN. THE LOSS OF MYELIN WITH AGE, SPECIFICALLY WITHIN A DEEP GRAY MATTER STRUCTURE CALLED THE HIPPOCAMPUS, MAY CONTRIBUTE TO THE WORSENERD MEMORY PERFORMANCE IN OLDER ADULTS. MYELIN CAN BE ASSESSED IN VIVO BY AT LEAST TWO MAGNETIC RESONANCE IMAGING (MRI) TECHNIQUES. THE FIRST IS MYELIN MAPPING, WHICH IS THE RATIO OF THE T1-WEIGHTED AND T2-WEIGHTED MRI SIGNALS AND PROVIDES MEASURES OF MYELIN CONTENT. THE SECOND IS BY DIFFUSION MRI IMAGING, WHICH MEASURES THE MOVEMENT OF WATER MOLECULES AND REVEALS MICROSTRUCTURAL PROPERTIES OF DIFFERENT EXTRACELLULAR AND INTRACELLULAR TISSUE COMPARTMENTS. THIS STUDY AIMED TO UTILIZE THESE IMAGING MODALITIES IN ORDER TO DETERMINE THE ROLE OF HIPPOCAMPAL MYELIN AND DIFFUSION TO EPISODIC MEMORY PERFORMANCE USING RAVLT MEMORY MEASURES AND THE ROLE OF HIPPOCAMPAL MYELIN IN DIFFUSION (NODDI) METRICS. RESULTS ILLUSTRATED THAT LOWER MYELIN CONTENT AND LOWER DIFFUSIVITY (DISPERSION OF DIFFUSION) WERE SIGNIFICANTLY RELATED TO BETTER EPISODIC MEMORY PERFORMANCE (IMMEDIATE RECALL), LOWER MYELIN CONTENT WAS SIGNIFICANTLY RELATED TO LOWER DIFFUSIVITY (INTRACELLULAR, DISPERSION), AND HIPPOCAMPAL MYELIN CONTENT SIGNIFICANTLY MEDIATED THE RELATIONSHIP BETWEEN DISPERSION OF DIFFUSION AND IMMEDIATE RECALL PERFORMANCE. THESE FINDINGS SHOW THAT MYELIN CONTENT IS CAPTURED BY DIFFUSION METRICS AND CONTRIBUTES TO THE RELATIONSHIP BETWEEN HIPPOCAMPAL DIFFUSION AND EPISODIC MEMORY PERFORMANCE.

FAIZAH AHMED, BIOLOGY

FACULTY MENTOR(S): JOHN FRANCHAK

PRACTICE EFFECT ON THE TRADEOFF BETWEEN WORKING MEMORY AND MOTOR MOVEMENT

WORKING MEMORY (WM) IS DEFINED AS THE TEMPORARY STORAGE AND MANIPULATION OF INFORMATION, SUPPORTING US IN EVERYDAY TASKS. ACCORDING TO A PREVIOUS STUDY, INDIVIDUALS UTILIZE MOTOR EFFORT TO MINIMIZE THE USE OF WORKING MEMORY (DRASCHKOW ET AL., 2020). PARTICIPANTS WERE ASKED TO COPY MODELS OF EIGHT BLOCKS ONTO A BLANK WORKSPACE AT PREDETERMINED ANGLE CONDITIONS (45°, 90°, 135°, OR 180°) IN ORDER TO DETERMINE THE NATURAL WM RELIANCE. RESULTS SHOWED PARTICIPANTS CHOSE TO MOVE FREQUENTLY TO GATHER INFORMATION ABOUT THE MODELS, INSTEAD OF MEMORIZING THEN COPYING FROM THEIR MEMORY, EVEN WHEN THE MODELS WERE AT LARGE ANGLES AND INCREASED PHYSICAL EFFORT IS REQUIRED. HOW DO PARTICIPANTS MODIFY THEIR RELIANCE ON MOTOR EFFORT OVER REPEATED TRIALS? I AIM TO INVESTIGATE THE PRACTICE EFFECT ON THE TRADEOFF BETWEEN MOTOR EFFORT AND WORKING MEMORY. I PREDICT THAT PARTICIPANTS WILL PROGRESS TO A MORE EFFICIENT TECHNIQUE BY INCREASING THEIR WM RELIANCE OVER REPEATED TRIALS.

A SIMILAR MODEL-COPYING TASK WILL BE USED; HOWEVER, PARTICIPANTS WILL BE ANALYZED ON HOW THEY ADJUST THEIR WM RELIANCE OVER 16 TRIALS. THEY WILL BE ASKED TO COPY DIFFERENT MODELS ONTO THEIR WORKSPACE FROM A TEMPLATE PLACED AT THE GIVEN ANGLE CONDITION. I WILL MEASURE HOW MANY TIMES AND HOW LONG PARTICIPANTS LOOK AT THE MODELS FROM TRIAL TO TRIAL. I PREDICT THAT PARTICIPANTS WILL LOOK LESS FREQUENTLY BUT FOR LONGER AT THE MODELS FROM TRIALS 1 TO 16 ESPECIALLY AT LARGER ANGLES, INDICATING THAT WITH PRACTICE INDIVIDUALS WILL INCREASE WM RELIANCE AND DECREASE MOTOR EFFORT RELIANCE.

RAWAN AL JUDEID, BIOLOGICAL SCIENCES

FACULTY MENTOR(S): KATHERINE STAVROPOULOS

PARENT-REPORTED SATISFACTION DURING ONLINE EDUCATION DURING COVID-19 FOR CHILDREN WITH AND WITHOUT ASD

THIS CAPSTONE WILL STUDY HOW ONLINE LEARNING AFFECTS CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD). MY RESEARCH GOAL IS TO IDENTIFY HOW STUDENTS WITH ASD WERE IMPACTED BY ONLINE LEARNING DUE TO COVID-19 ALONG WITH CHANGES IN THEIR SOCIAL BEHAVIOR AND MENTAL HEALTH. DR. KATHERINE STAVROPOULOS AND I COLLECTED DATA FROM A QUESTIONNAIRE FOR PARENTS ASKING ABOUT THEIR CHILD'S EDUCATIONAL PERFORMANCE AND MENTAL HEALTH PRE VS. POST-COVID-19 FROM 33 PARENTS OF CHILDREN WITH ASD AND 24 PARENTS OF NEUROTYPICAL CHILDREN. THIS STUDY WILL ENABLE US TO IDENTIFY FACTORS THAT AFFECT PARENTAL SATISFACTION WITH ONLINE VERSUS IN-PERSON EDUCATION SYSTEMS. WE WILL USE SPSS TO ANALYZE COLLECTED DATA. WE HYPOTHEZIZE THAT CHILDREN WITH ASD MIGHT HAVE STRUGGLED MORE THAN NEUROTYPICAL CHILDREN DURING COVID-19 DUE TO THE CHANGE IN THEIR LEARNING ENVIRONMENT.

YANINA ALDAO GALVAN, PLANT BIOLOGY

FACULTY MENTOR(S): DARREL JENERETTE

EXPLORING BIOLOGICAL SOIL CRUST RECOVERY POST FIRE ALONG A SEVENTY YEAR CHRONOSEQUENCE

WILDFIRES IN THE MOJAVE DESERT HAVE HISTORICALLY BEEN RARE; HOWEVER, IN THE LAST 40 YEARS, WILDFIRES HAVE BEEN RECORDED AS ONE OF THE MOST NEGATIVE FACTORS IMPACTING JOSHUA TREE WOODLANDS; IT IS ESTIMATED THAT 1.3 MILLION TREES WERE LOST IN THE CIMA DOME FIRE OF 2020. THE RELATIONSHIP BETWEEN JOSHUA TREES AND BIOLOGICAL SOIL CRUST (BIOCRUST) IS NOT WELL KNOWN; HOWEVER, BIOCRUSTS AFFECT SOIL MOISTURE, TEMPERATURE, NUTRIENT AVAILABILITY, INFLUENCE THE GERMINATION OF VASCULAR PLANTS, AND MAY PLAY A FUNDAMENTAL ROLE IN PLANT RE-ESTABLISHMENT POST-FIRE. BIOCRUSTS ARE A DIVERSELY RICH NETWORK OF ORGANISMS, INCLUDING MOSSES, LICHENS, ALGAE, BACTERIA, AND FUNGI, ESSENTIAL TO THE ECOLOGY OF ARID LANDS AS THEY COVER 12% OF THE TERRESTRIAL SURFACE AND ARE VITAL IN MANY ECOLOGICAL PROCESSES. HOWEVER, OUR UNDERSTANDING OF THE RECOVERY OF BIOCRUST AND THE ECOLOGICAL PROCESSES IT MEDIATES SEVERAL YEARS AFTER A FIRE IS LIMITED. THIS RESEARCH AIMS TO UNDERSTAND HOW BIOCRUSTS IN JOSHUA TREE WOODLANDS RECOVER BY ANALYZING RESPIRATION RATE, TEMPERATURE, AND WATER INFILTRATION RATES AFTER VARIOUS TIME LAPSES. BURNED PLOTS WERE CHOSEN AT <1, <5, <20, <30, <40, AND <65 YEARS POST-BURN IN WHICH TO SAMPLE VEGETATION AND BIOCRUST COMMUNITIES. WE PREDICT THAT CO₂ GAS EXCHANGE MEASUREMENTS WILL REVEAL LARGE RESPIRATION RATES OF LATE-SUCCESSIONAL CRUSTS BEING SIGNIFICANTLY HIGHER THAN THOSE OF INITIAL BIOCRUSTS. WE WILL MONITOR THE COVER OF BIOCRUST MOSS AND LICHEN SPECIES, MEASURE SOIL INFILTRATION RATES, AND SOIL SURFACE TEMPERATURES. THESE DATA WILL ALLOW US TO UNDERSTAND HOW BIOCRUST COLONIZES BURNED SOIL AND HOW IT REGENERATES OVER TIME.

EYAD ALSALEK, BIOCHEMISTRY**JESSALYN YAM, BIOLOGY**

FACULTY MENTOR(S): ANA BAHAMONDE

MILD SUSTAINABLE AMIDE ALKYLATION PROTOCOL ENABLES A BROAD ORTHOGONAL SCOPE

HEREIN, THE DEVELOPMENT OF A MILD SUSTAINABLE PROTOCOL TO COUPLE PRIMARY ALKYL CHLORIDES AND BROMIDES WITH AMIDES IS DESCRIBED. IN CONTRAST TO CURRENT METHODOLOGIES, OUR SYSTEM DOES NOT REQUIRE THE USE OF STRONG BASIC CONDITIONS, HIGH TEMPERATURES, OR THE ADDITION OF AN ORGANOMETALLIC CATALYST, THEREBY ENABLING ACCESS TO A REMARKABLY ORTHOGONAL SCOPE. K₃PO₄ IS USED TO FACILITATE THE FORMATION OF SECONDARY AND TERTIARY AMIDES, WHICH ARE UBIQUITOUS SCAFFOLDS IN BIOACTIVE MOLECULES AND NATURAL PRODUCTS. ALKYLATED AMIDE PRODUCTS ARE OBTAINED IN GOOD TO EXCELLENT YIELDS, WITH NO SUBSTANTIAL

LIMITATIONS OBSERVED BASED ON THE STERIC AND ELECTRONIC PROPERTIES OF EITHER COUPLING PARTNER.

BIGY AMBAT, BIOCHEMISTRY

FACULTY MENTOR(S): ERICH RECK

A PHILOSOPHICAL ANALYSIS OF DIAGNOSIS REASONING BY PHYSICIANS AND APPLICATION IN AI SYSTEMS

OFTENTIMES, PHILOSOPHICAL IDEAS ARE AT THE FUNDAMENTAL ROOT OF VARIOUS DISCIPLINES, ESPECIALLY IN THE SCIENCES. THIS IS ALSO TRUE FOR THE FIELD OF MEDICINE. IN MY CAPSTONE, I EXAMINE THE PHILOSOPHY OF MEDICINE, A RELATIVELY NEW FIELD IN PHILOSOPHY OF SCIENCE, AND ANALYZE ITS APPLICATION TO AI MEDICAL DIAGNOSIS TECHNOLOGY. THROUGH VARIOUS STUDIES, DEEP LEARNING AI MEDICAL SYSTEMS HAVE PROVEN EXTREMELY ACCURATE WHEN ANALYZING CT SCANS, X-RAYS, AND OTHER SCREENING TESTS. WHILE THIS IS VERY PROMISING FOR THE MEDICAL FIELD, COMPUTER SCIENCE EXPERTS ARE HAVING MUCH DIFFICULTY ANALYZING THE THOUGHT PROCESSES OR RATIONALE THAT THESE DEEP LEARNING AI USE TO MAKE THEIR DECISIONS. THIS IS A WELL-KNOWN PROBLEM IN COMPUTER SCIENCE CALLED THE "BLACK BOX" PROBLEM. TO ADDRESS THIS "BLACK BOX PROBLEM", I FOCUS ON THE INTRINSIC PHILOSOPHICAL BASIS BEHIND THE REASONING AND LOGIC THAT DOCTORS USE TO DIAGNOSE SCREENING TESTS. BY ANALYSIS OF VARIOUS CLINICAL SCREENING TESTS, I UNCOVER THE PHILOSOPHICAL IDEAS AT THE ROOT OF THE PHYSICIAN DIAGNOSIS PROCESS. THEN, I CONDUCT AN ANALYSIS ON THE REASONING PROCESSES OF AI SYSTEMS. LATER, I DEMONSTRATE HOW THESE PHILOSOPHICAL DIAGNOSIS CONCEPTS FROM THE PHYSICIAN'S REASONING PROCESS CAN BE INTEGRATED INTO AI MEDICAL DIAGNOSIS SYSTEMS. THESE PHILOSOPHICAL REASONING IDEAS CAN PROVIDE A BEDROCK OF REASONING THAT COMPUTER SCIENTISTS CAN USE TO FURTHER DEVELOP THESE MEDICAL DEEP LEARNING AI SYSTEMS.

BIGY AMBAT, BIOCHEMISTRY

FACULTY MENTOR(S): HILL HARMAN

RECYCLING GREENHOUSE GASSES WITH TITANIUM AND BORON

THE NEGATIVE EFFECTS OF GREENHOUSE EMISSIONS AND INDUSTRIAL CHEMICAL PRODUCTION REQUIRE THE DEVELOPMENT OF NEW CATALYSTS FOR MORE EFFICIENT CHEMICAL RECYCLING. ENERGY-RELATED SMALL MOLECULE REACTIONS OFFER A ROUTE FOR TRANSFORMING COMMON SUBSTANCES LIKE H₂O, N₂, HYDROGEN GAS, AND CARBON DIOXIDE INTO MORE USEFUL CHEMICAL PRODUCTS LIKE METHANOL AND AMMONIA. BY TURNING WASTE CHEMICALS INTO SUBSTANCES THAT CAN BE USED, OVERALL SUSTAINABILITY CAN BE INCREASED. UNFORTUNATELY, MANY UBIQUITOUS SMALL MOLECULES ARE VERY THERMODYNAMICALLY AND KINETICALLY STABLE AND REQUIRE CHEMICAL CATALYSTS TO FACILITATE THEIR TRANSFORMATION. WE HAVE BEEN EXPLORING SMALL MOLECULE ACTIVATION REACTIVITY WITH MOLECULES DERIVED FROM 9,10-DIHYDRO-9,10-DIBOROANTHRACENE (DBA). REDUCED DBA COMPLEXES CONTAINING GOLD HAVE SHOWN NOVEL REACTIVITY WITH A RANGE OF IMPORTANT SMALL MOLECULES INCLUDING CO₂, O₂, AND H₂O. HOWEVER, GOLD IS AN EXPENSIVE ELEMENT AND THE REACTIONS DISCOVERED SO FAR ARE NOT CATALYTIC. USING CHEAPER TRANSITION METALS FROM EARLIER IN THE D-BLOCK LIKE TITANIUM MAY SURMOUNT THIS CHALLENGE. EARLY D-BLOCK METALS ARE MORE ELECTROPOSITIVE AND WILL LIKELY REQUIRE THE INCORPORATION OF LIGANDS CONTAINING STRONGER ELECTRON DONATING ELEMENTS SUCH AS NITROGEN. THIS PROJECT AIMS TO DESIGN AND TEST NEW NITROGEN RICH LIGANDS THAT CAN BE ATTACHED TO DBA AND FUNCTIONALIZE CHEAPER TRANSITION METAL SUBSTITUENTS. THE RESULTING DBA-TRANSITION METAL COMPLEXES WILL IDEALLY CATALYZE SMALL MOLECULE REACTIONS MORE EFFICIENTLY WHILE BEING CHEAPER TO PRODUCE.

SAMANTHA ASSAD, BIOCHEMISTRY

FACULTY MENTOR(S): DEVIN BINDER

ABNORMAL BEHAVIORAL PHENOTYPES IN JUVENILE AND ADULT FMR1 KO MICE

FRAGILE X SYNDROME (FXS) IS THE MOST COMMON GENETIC CAUSE OF INTELLECTUAL DISABILITY WITH SYMPTOMS THAT OVERLAP WITH AUTISM SPECTRUM DISORDERS (ASD). FXS IS CAUSED BY A MUTATION IN THE FRAGILE X MENTAL RETARDATION 1 (FMR1) GENE AND A LOSS OF FRAGILE X MENTAL RETARDATION PROTEIN (FMRP). FMRP IS AN RNA-BINDING PROTEIN THAT REGULATES NEURONAL FUNCTION THROUGH REGULATION OF PROTEIN TRANSLATION AND DIRECT INTERACTION WITH MEMBRANE CHANNELS. FXS SYMPTOMS INCLUDE INCREASED ANXIETY, REPETITIVE BEHAVIORS, SOCIAL COMMUNICATION DEFICITS, DELAYED LANGUAGE DEVELOPMENT, ABNORMAL SENSORY PROCESSING, AND COGNITIVE DEFICITS. STUDIES INVOLVING FXS PATIENTS HAVE DEMONSTRATED THAT THERE IS AN INCREASE IN THE AMOUNT OF ANXIETY RELATED ACTIVITIES. TO FURTHER UNDERSTAND THE TRANSLATIONAL ASPECT OF THESE BEHAVIORS IN THE MOUSE MODEL, IT IS NECESSARY TO EVALUATE DIFFERENT AGE MODELS SUCH AS JUVENILES AND ADULTS. ALTHOUGH THERE HAS BEEN EXTENSIVE RESEARCH DONE IN THE BEHAVIOR OF ADULT FMR1 KNOCKOUT MICE, THERE IS A GAP IN THE LITERATURE ON JUVENILE BEHAVIORAL MOUSE STUDIES. FILLING THIS GAP IN KNOWLEDGE IS ESSENTIAL DUE TO THE CURRENT RESEARCH ADDRESSING CHILDREN WITH FXS AND HAVING A SUITABLE MOUSE MODEL WILL ENABLE A MORE RELIABLE TRANSLATIONAL APPROACH. IN THIS STUDY, WE WILL EXAMINE THE ABNORMAL BEHAVIORAL PHENOTYPES IN JUVENILE AND ADULT FMR1 KO MICE BY PERFORMING BOTH A NEST BUILDING AND NEST REMOVAL/DIGGING TEST TO DETERMINE BASELINE BEHAVIOR FOR THE BASIS OF FUTURE TRANSLATIONAL BEHAVIORAL RESEARCH.

KIRSTEN BAILEY, MICROBIOLOGY

FACULTY MENTOR(S): KERRY MAUCK

EFFECTS OF BOKASHI FERMENTATION LEACHATE ON MELON RESISTANCE TO THE APHID VECTOR, APHIS GOSSYPII, AND CUCUMBER MOSAIC VIRUS

BOKASHI FERMENTATION IS A PROCESS FOR ACCELERATING DECOMPOSITION OF FOOD WASTE. IN HOME COMPOSTING SYSTEMS, FERMENTATION IS ACHIEVED BY LAYERING KITCHEN SCRAPS IN A BIN WITH EFFECTIVE MICROORGANISMS (EM-1 MIXTURE) CONSISTING OF LACTOBACILLUS CASEI, RHODOPSEUDOMONAS PALUSTRIS AND SACCHAROMYCES CEREVISIAE. THE RESULTING LIQUID AND SOLID FERMENTATION PRODUCTS ARE USEFUL FOR IMPROVING PLANT HEALTH IN GARDENS. SCALING UP THIS FERMENTATION PROCESS WOULD ALLOW GROWERS TO RECYCLE CROP WASTE INTO A MICROBE RICH LIQUID BYPRODUCT (LEACHATE). A RECENT STUDY SHOWED THAT BOKASHI LEACHATE ENHANCED PLANT HEALTH AND BENEFICIAL MICROBE LEVELS IN A CLOSED SYSTEM OF YOUNG CITRUS PLANTS. TO BUILD ON THIS RESEARCH, I TESTED THE EFFECTS OF BOKASHI FERMENTATION LEACHATE PRODUCED FROM WASTE CITRUS FRUITS ON PLANT GROWTH, RESISTANCE TO APHID VECTORS, AND RESISTANCE TO VIRUS INFECTION IN MELONS (CUCUMIS MELO).

THE TREATMENTS VARY BY THE PERCENTAGE OF LEACHATE IN A MODIFIED SOLUTION. A SERIES OF MELON PLANTS WERE GIVEN THREE DOSES OF THE SOLUTION WEEKLY. INITIAL WET WEIGHTS AND DRY WEIGHTS OF THE MELON PLANTS ARE COMPARED AFTER THREE WEEKS TO SEE ANY SIGNIFICANT CHANGES BETWEEN GROUPS. ELECTRICAL PENETRATION OF APHIDS INTO THE PLANT LEAVES AND CMV INOCULATION OF THE PLANTS TO DETERMINE RESISTANCE ABILITIES CONTINUE AFTER THE ELIMINATION OF TREATMENT GROUPS.

DHIRESH BANDARU, NEUROSCIENCE

FACULTY MENTOR(S): PRUDENCE TALBOT

A REVIEW OF THE CYTOTOXICITY OF FREQUENTLY USED FLAVOR CHEMICALS IN REFILL FLUIDS

E-CIGARETTES WERE INTRODUCED TO THE UNITED STATES IN THE EARLY 2000S AND HAVE GAINED RAPIDLY POPULARITY . E-CIGARETTES AEROSOLIZE A LIQUID, THAT THE USER THEN INHALES. ALTHOUGH MOST E-CIGARETTE LIQUIDS CONTAIN NICOTINE AND FLAVOR CHEMICALS WHICH HAVE DRAWN YOUTH TO USE E-CIGARETTES. EVIDENCE IS GROWING THAT FLAVOR CHEMICALS IN THE REFILL FLUIDS CAN CAUSE HARM UPON INHALATION. SEVEN OF THE MOST POPULAR FLAVOR CHEMICALS IN REFILL FLUIDS WERE CHOSEN TO STUDY IN THIS REVIEW. ETHYL VANILLIN, VANILLIN, CINNAMALDEHYDE, MALTOL, ETHYL MALTOL, BENZYL ALCOHOL, AND MENTHOL. FIFTY-SEVEN ORIGINAL ARTICLES (COLLECTED FROM PUBMED, AND GOOGLE SCHOLAR) ON THE CYTOTOXICITY OF FLAVOR CHEMICALS WERE COLLECTED AND CRITICALLY ANALYZED. MANY OF THESE FLAVOR CHEMICALS ARE FOUND FREQUENTLY AND ARE PRESENT IN HIGH CONCENTRATIONS. THE EFFECTS OF THESE FLAVOR CHEMICALS INCLUDED REDUCING MITOCHONDRIAL REDUCTASE ACTIVITY, DECREASING CELLULAR VIABILITY, INCREASING THE PRODUCTION OF REACTIVE OXYGEN SPECIES, INCREASING THE EXPRESSION OF PROINFLAMMATORY MOLECULES, AND DISRUPTING EPITHELIAL BARRIERS. MORE RESEARCH IS NEEDED ON THE SPECIFIC EFFECTS OF THESE FLAVOR CHEMICALS, AS WELL AS THE CYTOTOXIC EFFECTS OF OTHER FLAVOR CHEMICALS THAT CAN BE FOUND IN REFILL FLUIDS OF E-CIGARETTES.

STACY BENCOMO, BIOLOGY

FACULTY MENTOR(S): DIAMOND BRAVO

IMPLICIT BIAS IN HEALTHCARE PROFESSIONALS

WHILE THE HEALTHCARE INDUSTRY STRIVES FOR EQUITY AMONGST ALL PATIENTS, DISPARITIES ARE STILL RAMPANT THROUGH ALMOST EVERY ASPECT OF CARE. RESEARCH SUPPORTS THAT THESE DISPARITIES ARE OFTEN PERPETUATED BY WHAT IS COMMONLY REFERRED TO AS "IMPLICIT BIAS." IMPLICIT BIAS IS DEFINED AS UNINTENTIONAL CULTURAL AND ENVIRONMENTAL INFLUENCES THAT CAN AFFECT THE WAYS IN WHICH PEOPLE PROCESS AND CREATE THEIR PERSPECTIVES ABOUT PEOPLE. THESE UNINTENDED BIASES CAN EQUALLY AFFECT EVERY INDIVIDUAL, INCLUDING PHYSICIANS AND OTHER HEALTHCARE PROFESSIONALS. IMPLICIT BIASES CAN ALTER PHYSICIAN BEHAVIOR AND MEDICAL DECISION-MAKING, RESULTING IN A DIFFERENCE IN MEDICAL CARE BETWEEN DIFFERENT RACIAL AND ETHNIC GROUPS OF PEOPLE. THROUGHOUT THIS RESEARCH, A BRIEF DESCRIPTION OF THE ORIGINS OF IMPLICIT BIASES WAS PROVIDED FOLLOWED BY RESEARCH THAT SUPPORTS THE PRESENCE OF IMPLICIT BIASES AMONGST PRACTICING PHYSICIANS. A SMALL SAMPLE OF APPROXIMATELY 10-15 PHYSICIANS WORKING IN A LOWER SOCIOECONOMIC COMMUNITY WILL BE ADMINISTERED A RACE IMPLICIT ASSOCIATION TEST (IAT) AND A SKIN-TONE IMPLICIT ASSOCIATION TEST (IAT) IN ORDER TO DETERMINE WHETHER OR NOT AN IMPLICIT BIAS IS PRESENT TOWARDS SPECIFIC RACIAL GROUPS. THIS DATA WILL THEN BE ANALYZED TO EXAMINE HOW THE EFFECTS OF IMPLICIT BIAS IMPACT MEDICAL DECISION-MAKING. STRATEGIES WILL THEN BE SUGGESTED ON POTENTIAL BIASES IN THE MEDICAL OR CLINICAL SETTINGS.

PARASH BHAKTA, NEUROSCIENCE

FACULTY MENTOR(S): KENDRICK DAVIS

INCIDENCE OF DEPRESSION, ANXIETY, AND STRESS IN PRE-MEDICAL STUDENTS AT THE UNIVERSITY OF CALIFORNIA, RIVERSIDE SCHOOL OF MEDICINE

STRESS, ANXIETY, AND DEPRESSION HAVE LONG SINCE AFFECTED THE HEALTH OF MEDICAL STUDENTS AND PHYSICIANS IN AMERICA.

NUMEROUS STUDIES HAVE CONFIRMED THAT MEDICAL STUDENTS AND PHYSICIANS ARE AT A HIGHER RISK OF BURNOUT, DEPRESSION, AND STRESS IN COMPARISON TO OTHER PROFESSIONALS. IT HAS BEEN NOTED THAT THE MENTAL HEALTH OF STUDENTS BEGINS TO DECLINE AS EARLY AS THEIR UNDERGRADUATE EDUCATION. UNIVERSITIES ARE EQUIPPED WITH RESOURCES TO SUPPORT THE MENTAL HEALTH OF THEIR STUDENTS. HOWEVER, IT HAS BEEN A LONG-STANDING QUESTION OF HOW MUCH THESE RESOURCES ARE ACCESSED BY THE STUDENTS WHO NEED THEM, PARTIALLY DUE TO TWO FACTORS; A LACK OF AWARENESS OF SUCH RESOURCES, AND STIGMAS ASSOCIATED WITH SEEKING THEM. THE PANDEMIC IMPACTS THIS SITUATION FURTHER IN THAT BOTH PAST WAYS OF INFORMING STUDENTS OF NEEDED RESOURCES HAVE BEEN COMPLETELY DISRUPTED, AND STRESS HAS INCREASED. THE GOAL OF THIS STUDY IS TO UNCOVER DEPRESSION, STRESS, AND OTHER MENTAL HEALTH CONDITIONS IN PREMEDICAL UNDERGRADUATES AT THE UNIVERSITY OF CALIFORNIA RIVERSIDE (UCR) BY UTILIZING STANDARDIZED QUESTIONNAIRES, SUCH AS THE PHQ-9 AND GAD-7. BY CONDUCTING THIS RESEARCH, THE FINDINGS WOULD ALLOW THE UNIVERSITY TO IMPROVE THE MENTAL HEALTH OF THEIR UNDERGRADUATE STUDENTS, SUCH AS THROUGH ESTABLISHING A PROGRAM OR INTERVENTION TO PROMOTE THE IMPORTANCE OF MENTAL HEALTH AND WELLNESS. THROUGH THIS RECOGNITION, THIS RESEARCH HOPES TO LESSEN THE CONSEQUENCES OF DEPRESSION AND BURNOUT IN MEDICAL STUDENTS' ACADEMIC AND PROFESSIONAL PERFORMANCE SUCH AS LOWER-QUALITY PATIENT CARE AND POOR GRADES BY TARGETING ANXIETY AND DEPRESSION IN THE UNDERGRADUATE YEARS.

SAKSHI BHATT, NEUROSCIENCE

FACULTY MENTOR(S): ELIZABETH DAVIS

ASSOCIATIONS BETWEEN RESPIRATORY HEALTH AND EMOTION REGULATION IN CHILDREN

THE INLAND EMPIRE IS NOTORIOUS FOR POOR AIR QUALITY, MAKING THE RELATIONSHIP BETWEEN RESPIRATORY PROBLEMS AND CHILDREN'S SOCIOEMOTIONAL DEVELOPMENT HIGHLY INTERESTING TO INVESTIGATE. THE CURRENT STUDY EMPLOYS A BIOBEHAVIORAL APPROACH TO STUDY EMOTION REGULATION AS IT RELATES TO RESPIRATORY DISEASES SUCH AS ASTHMA, RESPIRATORY INFECTIONS, AND ALLERGIES, PROVIDING INSIGHT ON CHILDREN'S HEALTHY DEVELOPMENT. THE PHYSIOLOGY AND EMOTION REGULATION IN KIDS(PERK) STUDY CONDUCTED BY THE EMOTION REGULATION LAB AT THE UC RIVERSIDE FROM 2013 TO 2015 INCLUDED 184 CHILD-PARENT DYADS FROM A DIVERSE POPULATION IN THE INLAND EMPIRE. PARENTS REPORTED ON THEIR CHILD'S RESPIRATORY HEALTH AND EMOTION REGULATION ABILITIES. RESPIRATORY SINUS ARRHYTHMIA(RSA) WAS DERIVED FROM CHILD PHYSIOLOGICAL DATA COLLECTED THROUGHOUT THE STUDY AND OBSERVED BEHAVIORAL DISTRESS WAS ASSESSED THROUGH AN EMOTIONAL TASK. IN SUPPORT OF OUR HYPOTHESES, RESULTS INDICATE THAT CHILDREN WITH RESPIRATORY ILLNESSES EXPERIENCED SIGNIFICANTLY MORE DISTRESS($M = 2.02$, $SD = .57$) COMPARED TO CHILDREN WITHOUT RESPIRATORY ILLNESS($M = 1.75$, $SD = .684$), $T(182) = -2.643$, $p = .008$. CONTRARY TO HYPOTHESES, CHILDREN WITH RESPIRATORY ILLNESSES($M = 27.83$, $SD = 6.49$) AND CHILDREN WITHOUT RESPIRATORY ILLNESSES($M = 25.98$, $SD = 6.961$) DID NOT SIGNIFICANTLY DIFFER IN THEIR EMOTION REGULATION SKILLS, $T(182) = -1.497$, $p > .05$, NOR RSA BASELINES, $T(182) = -.137$, $p > .05$. OUR RESEARCH HIGHLIGHTS THE POSSIBLE CONSEQUENCES OF POOR RESPIRATORY HEALTH IN THE INLAND EMPIRE. FUTURE RESEARCH SHOULD FOCUS ON POSSIBLE MECHANISMS/MODERATORS THAT HELP EXPLAIN THE ASSOCIATION BETWEEN RESPIRATORY ILLNESS AND BEHAVIORAL DISTRESS (E.G., COGNITIVE OR PHYSIOLOGICAL INDICATORS OF EMOTION REGULATION).

SHRADDHA BHONSLE, CELL, MOLECULAR, AND DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): FRANCES SLADEK

IDENTIFICATION OF ALTERNATIVELY SPLICED GENES IN METABOLIC DISEASE PATHWAYS

ALTERNATIVE SPLICING IS A PROCESS BY WHICH EXONS WITHIN PRE-MRNA ARE EITHER INCLUDED OR REMOVED TO GENERATE DIFFERENTIALLY SPLICED MRNAs. A SINGLE GENE CAN BE ALTERNATIVELY SPLICED IN NUMEROUS COMBINATIONS TO GIVE RISE TO UNIQUE

MRNAs AND THUS A DIVERSE SET OF PROTEINS THAT DIFFER IN THEIR SEQUENCE AND FUNCTION. IT IS NOW RECOGNIZED THAT MANY GENES INVOLVED IN METABOLIC DISEASE PATHWAYS RESULT FROM ALTERNATIVELY SPLICED GENES, THUS IDENTIFYING AND QUANTIFYING THESE ARE CRITICAL TO ELUCIDATING DISEASE MECHANISMS. USING BIOINFORMATIC ANALYSIS GENERATED BY GRADUATE STUDENTS IN THE SLADEK LAB, I WILL MANUALLY CURATE GENES THAT ARE POTENTIALLY ALTERNATIVELY SPLICED BY ANALYZING TRANSCRIPTOMIC (RNASeq) DATA OBTAINED FROM THE LIVERS OF BOTH MALE AND FEMALE MICE UNDER SEVERAL DIFFERENT CONDITIONS – FED VERSUS FASTED, WILDTYPE, AND A7HMZ MICE WHICH EXPRESS AN ALTERNATIVE FORM OF THE TRANSCRIPTION FACTOR HNF4A IN THE LIVER. I WILL USE RNA FROM EXON SWAP MICE WHICH EXPRESS DIFFERENT SPLICE VARIANTS OF HNF4A WHICH REGULATES MUCH OF THE METABOLISM IN THE LIVER AS POSITIVE CONTROLS. ONCE I IDENTIFY POTENTIAL TARGETS, I WILL DESIGN SPLICE VARIANT-SPECIFIC PRIMERS USING UCSC GENOME BROWSER. I WILL VERIFY THE PRIMERS USING IN-SILICO PCR, PERFORM A RT-PCR REACTION, AND RUN THE PRODUCTS ON AN AGAROSE GEL. THE GOAL IS TO EXPERIMENTALLY CONFIRM ONE OR MORE ALTERNATIVELY SPLICED TRANSCRIPTS PREDICTED BY THE BIOINFORMATICS PROGRAM, DEXSEQ. USING THIS INFORMATION, WE CAN LEARN MORE ABOUT THE METABOLIC DISEASE PATHWAY AND POTENTIALLY DEVELOP TARGETED AND EFFECTIVE THERAPIES FOR THEM.

KEVIN BOATENG, BIOLOGY

FACULTY MENTOR(S): KURT ANDERSON

BLEPHARISMA SIZE AND POPULATION DENSITY AS A FUNCTION OF PREY SPECIES

THE UNICELLULAR PROTIST SPECIES BLEPHARISMA IS KNOWN TO UNDERGO PHYSICAL CHANGES DEPENDING ON DISTINCT ENVIRONMENTAL STRESSORS SUCH AS PREY SPECIES SIZE. THE PURPOSE OF THIS STUDY IS TO EXPLORE THE BOUNDS OF BLEPHARISMA'S PHENOTYPIC PLASTICITY AND DETERMINE IF THIS PROTIST SPECIE'S MORPHOLOGICAL SIZE, AS WELL AS POPULATION ABUNDANCE, CAN BE ALTERED AS A FUNCTION OF PREY SPECIES SIZE. TETRAHYMENA AND COLPIDIUM ARE MODEL SPECIES WHICH DIFFER IN SIZE, WITH TETRAHYMENA BEING ~ 25 μM IN SIZE AND COLPIDIUM ~50 μM IN SIZE. USING THESE TWO PREY SPECIES WHICH DIFFERED HEAVILY IN SIZE WAS A GOOD WAY OF ASSESSING BLEPHARISMA SIZE CHANGES. BLEPHARISMA WAS PLACED WITH TWO DIFFERENT PREY SPECIES AND OVER THREE DAYS CHANGES IN ITS SIZE, AS WELL AS ITS POPULATION DENSITY, WERE RECORDED. USING THE VIDEO CAPTURE SOFTWARE IMAGEJ, APPROXIMATELY 640 VIDEOS WERE TAKEN. INITIAL VIDEOS WERE TAKEN ONE DAY PRIOR TO THE FINAL VIDEOS. THIS WAS DONE TO CAPTURE CHANGES IN SIZE FROM ONE DAY TO THE NEXT TO ASSESS IF BLEPHARISMA'S BODY SIZE WOULD CHANGE AS A FUNCTION OF HOW MUCH PREY IT HAS EATEN. DATA ANALYSIS IS STILL IN PROGRESS BUT WE PREDICT THAT, BECAUSE BLEPHARISMA SIZE AND GROWTH RATE ARE POSITIVELY CORRELATED WITH INCREASED PREY SIZE, THAT BLEPHARISMA WILL HAVE THE HIGHEST AVERAGE MORPHOLOGICAL SIZE AND POPULATION DENSITY WHEN FEEDING ON COLPIDIUM PREY SPECIES. THESE RESULTS WILL CONTRIBUTE TO THE OVERALL UNDERSTANDING OF HOW PREDATOR FORAGING BEHAVIOR CONTRIBUTES TO POLYPHENIC CHANGES TO THEIR MORPHOLOGY AS WELL AS THEIR POPULATION DYNAMICS.

NICHOLAS BRINKLEY, BIOLOGY

FACULTY MENTOR(S): ERITH JAFFE-BERG

EXPLORING MENTAL HEALTH THROUGH ARTWORK

ART IS INCREDIBLY POWERFUL. IT TOUCHES US EMOTIONALLY WHILE DEEPLY STIMULATING THE DEEP UNCONSCIOUS TO THAT END. IT CAN BE A TOOL TO POTENTIALLY INFLUENCE OUR CULTURE, OUR RELATIONSHIPS, OUR LIVES, AND OUR MIND. ARTWORK AND PSYCHIATRIC DISORDERS ARE OFTEN LINKED WITH EACH OTHER AS THE ARTIST EXPRESSES THEMSELVES, THEIR FEELINGS, AND THEIR EMOTIONAL ANGUISH THROUGH THEIR WORKS, HOPING TO HELP THEMSELVES AND THEIR AUDIENCE COPE WITH THEM. I PLAN TO PRESENT A SERIES OF DIGITAL WORKS OF ART THAT HIGHLIGHT THE MENTAL TURMOIL I HAVE GRAPPLED WITH FOR SO MANY YEARS, AS WELL AS ONES I HAVE WITNESSED CERTAIN

MEMBERS OF MY FAMILY FIGHT AGAINST. IT IS SEEMINGLY A FORM OF VISUAL PSYCHODRAMA AND IT WOULD BE USED TO HELP END THE STIGMA AND PROVIDE A VIEWING OUTLET FOR THOSE WHO HAVE EXPERIENCED MENTAL HEALTH PROBLEMS. PAINTINGS, MOVIES, PLAYS, AND MUSIC SERVE AS A POINT OF EMBARKATION FOR THERAPY SESSIONS, WITH THE GOAL OF ASSISTING AN INDIVIDUAL'S EXPERIENCE AND JOURNEY OF RECOVERY. PERFORMANCES, PSYCHODRAMAS, AND THEATER ALL SERVE AS THOROUGH INSPIRATION FOR THE RESPECTIVE ARTIST. I WILL BE CREATING BETWEEN FIVE TO SIX DIGITAL WORKS OF ART THAT PORTRAY THE HUMAN EXPERIENCE OF PSYCHIATRIC DISORDERS. SOME OF MY WORKS ARE INSPIRED BY DIFFERENT PLAYWRIGHTS AND ARTISTS; I HOPE TO CREATE A FINAL PROJECT THAT COMBINES THEATER, VISUAL ART, AND ART THERAPY AS A MEANS TO EXPLORE MENTAL HEALTH AWARENESS. IT IS QUITE CATHARTIC FOR THE ARTIST TO PUT THEIR FEELINGS ONTO THE CANVAS TO INVOKE CHANGE AND INSPIRATION.

DAWSON BYRD, CELL, MOLECULAR, AND DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): KERRY MAUCK

GUT-CONTENT ANALYSIS OF SAP-FEEDING INSECTS

THE ASIAN CITRUS PSYLLID, *DIAPHORINA CITRI*, (ACP) IS A SAP-FEEDING INSECT THAT TRANSMITS BACTERIAL PLANT PATHOGENS IN THE GENUS *CANDIDATUS LIBERIBACTER*, AGENTS OF THE INCURABLE CITRUS GREENING DISEASE. THESE PATHOGENS DISRUPT THE FUNCTION OF PHLOEM ELEMENTS RESPONSIBLE FOR TRANSPORTING NUTRIENTS WITHIN PLANTS. WHILE FEEDING, ACP TRANSMITS THE BACTERIA AND INGESTS INTRACELLULAR MATERIAL, INCLUDING DNA, FROM THE PLANT. THE INFORMATION WITHIN THEIR GUT CONTENTS CAN BE USED TO INVESTIGATE THE ECOLOGY OF HOST USE BY ACP AND THE PATHOGEN IT TRANSMITS. HOWEVER, VALIDATION OF GUT CONTENT ANALYSIS FOR DISTINGUISHED HOST PATTERNS HAS ONLY BEEN PERFORMED FOR A FEW PSYLLID SPECIES AND HAS NOT BEEN EXPLORED FOR OTHER VECTORS THAT FEED SIMILARLY. TO ADDRESS THESE KNOWLEDGE GAPS, WE CONDUCTED DNA EXTRACTIONS WITH ACP AND AN APHID SPECIES, *MYZUS PERSICAE*, TO SCREEN FOR THE POTENTIAL INGESTION OF PLANT DNA ACQUIRED DURING CONTROLLED FEEDING BOUTS ON DIFFERENT HOST PLANTS. HOST DNA DETECTION WAS PERFORMED USING PCR WITH PRIMER SETS DESIGNED TO AMPLIFY REGIONS OF THE CONSERVED CHLOROPLAST *trnL* GENE. AMPLICONS UNDERWENT SANGER SEQUENCING, AND RESULTING SEQUENCES WERE ANALYZED USING BIOINFORMATIC TOOLS AND DATABASES TO CONFIRM THE PRESENCE AND IDENTITY OF PLANT DNA IN INSECT EXTRACTS. EXPERIMENTS WITH APHIDS WERE PERFORMED SIMILARLY. IN THIS STUDY, WE DEMONSTRATE THAT BOTH THE APHIDS AND PSYLLIDS ARE CAPABLE OF INGESTING AND RETAINING PLANT DNA IN THEIR GUT. THIS STUDY AND ITS TECHNIQUES WILL GUIDE FUTURE WORK IN THE EXPLORATION OF EMERGING BACTERIAL PLANT PATHOGENS TRANSMITTED BY SAP-FEEDING INSECTS AND THEIR MIGRATORY PATTERNS ACROSS HOST PLANTS WITHIN THE ECOSYSTEM.

GINA CALDERON, BIOLOGY

FACULTY MENTOR(S): PADMINI VARADARAJAN

THE EFFECTS OF BURNOUT IN MEDICAL SCHOOL STUDENTS

MEDICAL SCHOOL CAN BE A CHALLENGING ENVIRONMENT, AND IT IS NOT UNUSUAL FOR MEDICAL STUDENTS TO FEEL BURNT OUT DUE TO THE STRESSFUL NATURE OF THEIR FIELD. BURNOUT REFERS TO THE EXPOSURE TO EXTREME STRESS AND A DEMANDING WORK ENVIRONMENT THAT LEADS TO PHYSICAL AND MENTAL EXHAUSTION. MEDICAL STUDENTS WHO ARE EXCESSIVELY SUBJECTED TO THIS KIND OF ENVIRONMENT ARE MORE LIKELY TO EXPERIENCE A SUBPAR EDUCATION. BURNOUT CAN LEAD TO POOR ACADEMIC AND CLINICAL PERFORMANCE THAT CAN HINDER THEIR EFFORTS TO BECOME COMPETENT PHYSICIANS. THIS STUDY INTENDS TO EXAMINE BURNOUT IN MEDICAL STUDENTS AND THE EFFECTS IT HAS ON THEIR EDUCATION AND PERFORMANCE THROUGH THE EVALUATION OF SEVERAL LITERATURE REVIEWS. BURNOUT CAN HAVE A NEGATIVE IMPACT ON BOTH MEDICAL STUDENTS AND THE PATIENTS THAT THEY TREAT DUE TO THE MENTAL AND PHYSICAL HARDSHIPS

THAT CAN DISTORT THEIR MOTIVATIONS. THE NEGATIVE REPERCUSSIONS OF BURNOUT NEED TO BE EVALUATED SO THAT STUDENTS ARE ABLE TO SUCCEED IN BECOMING PHYSICIANS.

LUIS CAMPOY, NEUROSCIENCE

FACULTY MENTOR(S): MARGARITA CURRAS-COLLAZO

EXPLORING SEXUAL DIMORPHISM IN FOREBRAIN SOCIAL NEUROPEPTIDE GENE MARKERS DYSREGULATED BY MATERNAL TRANSFER OF INDOOR FLAME RETARDANTS

AUTISM SPECTRUM DISORDER (ASD) IS A NEURODEVELOPMENTAL DISORDER CHARACTERIZED BY SOCIAL DEFICITS, LANGUAGE DIFFICULTIES AND REPETITIVE BEHAVIOR (COSTA & GIORDANO, 2007). THE RAPID RISE IN ASD INCIDENCE CORRESPONDS WITH THE INCREASED PRODUCTION OF POLYBROMINATED DIPHENYL ETHERS (PBDEs), INDOOR FLAME RETARDANTS FOUND IN HUMAN BREASTMILK (ALAE & WENNING, 2002). WE FOUND THAT A COMMERCIAL PBDE MIXTURE, DE-71, GIVEN TO MOUSE MOTHERS, REDUCES SOCIAL RECOGNITION MEMORY AND ALTERS GENE EXPRESSION OF 'SOCIAL' NEUROPEPTIDES. RECENTLY, WE SHOWED THAT DE-71-EXPOSED FEMALES DISPLAY DECREASED AVP AND OXT MRNA IN BNST AND SON (KOZLOVA ET AL., 2021). HOWEVER, EXAMINATION OF MALE OFFSPRING IS NEEDED. I WILL TEST THE HYPOTHESIS THAT DE-71 REDUCES OXT AND/OR AVP AND/OR RECEPTORS (AVP1AR, OXTR). MOUSE DAMS WILL BE EXPOSED TO DE-71 (0.1MG/KG/D) FOR 10WK PERINATALLY. CONTROLS WILL RECEIVE CORN OIL VEHICLE. MALES WILL UNDERGO THE SOCIAL NOVELTY PREFERENCE TEST. BRAINS WERE CUT ON A CRYOSTAT AND REGIONS OF INTEREST PUNCHED OUT USING A MICROPUNCH TECHNIQUE. RNA WAS ISOLATED AND PURITY AND INTEGRITY EXAMINED USING NANODROP (260/230 RATIO ~2.07, 260/230 RATIO ~2.16). PRIMERS THAT WILL BE USED IN RT-QPCR ARE 89.1% TO 107.1% EFFICIENT. THE NEXT STEP WILL BE TO MEASURE OXT, OXTR, AVP, AVP1AR IN SON AND (PVN, BNST, LATERAL SEPTUM (LS), AMYGDALA (AMG) USING RT-QPCR. OUR FINDINGS COULD SHOW WHY PBDEs ALTER BRAIN NEUROCHEMISTRY AND INCREASE AUTISM RISK DIFFERENTLY IN GIRLS AND BOYS.

HEIDI CHAVEZ, BIOLOGY

FACULTY MENTOR(S): LOUIS SANTIAGO

LEAF WATER POTENTIAL IS RELATED TO SPECTRAL REFLECTANCE IN FIVE NATIVE CALIFORNIA SHRUB SPECIES

CALIFORNIAN SPECIES CAN SURVIVE LEAF WATER POTENTIALS BELOW THEIR TURGOR LOSS POINT. MEASURING WATER POTENTIAL USING PRESSURE CHAMBERS IS DESTRUCTIVE TO A PLANT AND REPEATED MEASUREMENTS ARE CHALLENGING ON SMALL SHRUBS WITH LIMITED NUMBER OF LEAVES. ALTERNATIVE METHODS ARE AVAILABLE, USING THE RATIO OF SPECTRAL REFLECTANCE OF THE LEAF AT 900/970 NM. WE EXPLORED THE RELATIONSHIP BETWEEN WATERBAND AND WATER POTENTIAL OF FIVE CALIFORNIA CHAPARRAL AND COASTAL SAGE SCRUB SPECIES AND IDENTIFIED SPECIES DIFFERENTIATION IN THE TURGOR LOSS POINT AND THE RELATIONSHIP BETWEEN WATERBAND AND RELATIVE WATER CONTENT.

DURING THREE CONSECUTIVE WEEKS, WATER POTENTIAL AND WATERBAND WERE MEASURED ON NATIVE SPECIES; SALVIA MELLIFERA, SALVIA LEUCOPHYLLA, CEANOTHUS TOMENTOSUS, ERIOGONUM FASCICULATUM, AND ENCELIA FARINOSA. LEAVES WERE LAID OUT TO DRY FOR SPECIFIC TIME INTERVALS THEREAFTER MEASURED FOR 8 ROUNDS TO DETERMINE TLP.

E. FASCICULATUM HAD THE LOWEST TLP AT -3.7 MPA, WHILE E. FARINOSA HAD THE HIGHEST TLP AT -1.7 MPA, INDICATING E. FASCICULATUM CAN TOLERATE DRIER CONDITIONS COMPARED TO E. FARINOSA. WATERBAND DECREASED WITH WATER POTENTIAL, AS WELL AS WITH RELATIVE WATER CONTENT. INDICATING THE STRONG RELATIONSHIP BETWEEN LEAF SPECTRAL REFLECTANCE AND ITS WATER POTENTIAL.

LOOKING AT WATER POTENTIAL AND WATERBAND ALONGSIDE TURGOR LOSS POINT SHOWED A POSITIVE RELATIONSHIP AND CAN BE USED TO STUDY PLANT DROUGHT TOLERANCE AND HOW MUCH DROUGHT STRESS DIFFERENT SPECIES CAN TOLERATE. OVERALL, THE RELATIONSHIP

BETWEEN WATERBAND AND RELATIVE WATER CONTENT CAN BE IMPORTANT TO DISCOVER FASTER WAYS TO MEASURE A PLANT'S WATER STATUS AND ASSESS WHETHER IT IS AT RISK OF DEHYDRATING.

KELLY CHEN, BIOLOGY

FACULTY MENTOR(S): MANUELA MARTINS-GREEN

STAPHYLOCOCCUS XYLOSUS BIOFILM AND ITS RESPONSE TO N-ACETYL-CYSTEINE

CHRONIC WOUNDS POSE A GRAVE UNIVERSAL HEALTH PROBLEM SINCE ONGOING TREATMENTS FOR CHRONIC WOUNDS LEAD TO SUBSTANTIAL FINANCIAL BURDEN FOR INDIVIDUALS AT A DISADVANTAGE. BIOFILM COMMUNITIES INFECTING CHRONIC WOUNDS ARE MORE TOLERANT TO ANTIBIOTICS, THEREBY CREATING A LARGER OBSTACLE FOR ERADICATION OF BACTERIA IN WOUNDS. UNDERSTANDING THE MECHANISMS INVOLVED IS FUNDAMENTALLY IMPORTANT IN TREATING WOUND INFECTIONS AND DEVELOPING MORE EFFICIENT WOUND MANAGEMENT STRATEGIES. OUR LAB HAS PREVIOUSLY SHOWN THAT OXIDATIVE STRESS AND BACTERIAL BIOFILMS ARE CRITICAL FACTORS IN CHRONIC WOUNDS IN MICE. N-ACETYL-CYSTEINE (NAC) TREATMENTS SHOWED REVERSAL OF CHRONICITY IN WOUNDS BY REDUCING OXIDATIVE STRESS, KILLING THE BACTERIA, AND DISMANTLING BIOFILM. THIS STUDY AIMS TO BETTER COMPREHEND THE MECHANISMS INVOLVED IN THE ABILITY OF NAC TO PREVENT BIOFILM INITIATION AND DEVELOPMENT BY STAPHYLOCOCCUS XYLOSUS. THIS BACTERIUM WAS IDENTIFIED AND ISOLATED FROM A WOUND. TO UNDERSTAND THE EFFECTS OF NAC ON S. XYLOSUS AND ITS BIOFILM, THE BIOFILM GROWTH IN THE PRESENCE OF NAC TREATMENTS WAS QUANTIFIED. TO OBSERVE OXIDATIVE STRESS RESPONSE BY S.XYLOSUS, EXPERIMENTS WITH VARYING CONCENTRATIONS OF HYDROGEN PEROXIDE WERE PERFORMED SEPARATELY AND WITH NAC TREATMENTS WHICH SUPPORTED EVIDENCE PROVIDED BY PREVIOUS EXPERIMENTS. A BETTER UNDERSTANDING OF HOW OR WHY NAC IS EFFECTIVE WAS MEASURED WITH A PH EXPERIMENT. RESULTS SHOW NAC IS MORE EFFECTIVE WHEN PH IS LOWER THAN PKA. CURRENTLY, THE PROTEIN CONTENT OF SAMPLES TREATED WITH NAC ARE BEING INVESTIGATED. THESE RESULTS WILL PROVIDE A GREATER UNDERSTANDING OF HOW TO DISRUPT THE EXISTING BIOFILM. THIS MAY CONTRIBUTE TO THE DEVELOPMENT OF NEW THERAPEUTICS FOR WOUNDS.

MILLENNIE CHEN, BIOCHEMISTRY

FACULTY MENTOR(S): MAURIZIO PELLECCIA

NOVEL STRATEGIES TO THE DESIGN OF PROTEIN DEGRADERS

APOPTOSIS, OR PROGRAMMED CELL DEATH, IS A BIOLOGICAL PROCESS IN WHICH MULTICELLULAR ORGANISMS ARE ABLE TO ELIMINATE DAMAGED OR UNWANTED CELLS. IT IS REGULATED IN PART BY A MYRIAD OF PRO- AND ANTI-APOPTOTIC REGULATORY PROTEINS, WHICH CAN EITHER PROMOTE OR INHIBIT THE PROCESS OF APOPTOSIS IN HEALTHY CELLS. IN CANCER CELLS, HOWEVER, THESE REGULATORY PROTEINS ARE OFTEN IMBALANCED, CAUSING THE INHIBITION OF APOPTOSIS AND THE UNCONTROLLED GROWTH OF TUMOR CELLS (BAGGIO ET AL., 2018). RECENTLY THE LABORATORY HAS DEVELOPED A NOVEL SERIES OF AGENTS TARGETING THE BIR3 DOMAIN OF IAP PROTEINS, CENTRAL REGULATORS OF APOPTOSIS IN CANCER CELLS. IAPS ALSO CONTAINS AN E3 LIGASE DOMAIN THAT CATALYZES UBIQUITINATION AND DEGRADATION OF OTHER PROTEINS. IN THIS POSTER I WILL REPORT ON OUR ATTEMPTS TO GENERATE MODIFIED VERSIONS OF THE IAP TARGETING AGENT TO A) INDUCE AUTO-DEGRADATION OF IAPS, OR B) TO INDUCE DEGRADATION OF A SECOND TARGET IN BI-FUNCTIONAL AGENTS (NAITO ET AL. 2019).

RICKY CHHOR, NEUROSCIENCE

FACULTY MENTOR(S): SACHIKO YAMANAKA

INVESTIGATING CAT FUR INDUCED FEAR BEHAVIOR AND CONTEXTUAL CONDITIONING IN MICE

INNATE FEAR RESPONSES ARE GENETICALLY ENCODED AND DO NOT REQUIRE ANY PRIOR LEARNING. CONDITIONED FEAR IS THE PROCESS OF DEVELOPING NEW NEURAL CIRCUITS THAT ASSOCIATES A SPECIFIC STIMULUS WITH POTENTIAL DANGER INVOLVING BRAIN REGIONS LIKE THE HIPPOCAMPUS. PREDATOR ODORANTS FOUND IN CAT SALIVA, FUR AND SNAKESKIN HAVE ALL BEEN FOUND TO INDUCE FREEZING, AN INNATE FEAR RESPONSE IN MICE AS WELL AS CONDITION THEM TO FEAR BASED ON CONTEXT. PREVIOUS STUDIES HAVE SHOWN THAT PROTEINS IN SNAKESKIN ARE ABLE TO ELICIT INNATE FEAR RESPONSES MEDIATED BY THE TRANSIENT RECEPTOR POTENTIAL ANKYRIN 1 (TRPA1), A CLASS OF ION CHANNELS HEAVILY EXPRESSED IN THE TRIGEMINAL GANGLION. IN THIS STUDY, WE DESIGNED AN EXPERIMENT TO DETERMINE WHETHER OR NOT THE PROTEINS IN CAT FUR CAN ELICIT THE SAME TRPA1 MEDIATED INNATE FEAR RESPONSE IN MICE. WE ALSO SEEK TO DETERMINE WHETHER OR NOT CAT FUR ALONE IS SUFFICIENT ENOUGH TO CONDITION MICE TO FEAR THE CONTAINER THEY WERE EXPERIMENTED IN. EXPERIMENTS WILL BE CONDUCTED ON TRPA1 KNOCKOUT MICE AND COMPARED WITH WILDTYPE (B6) MICE. A REMOTE CONTROL TRAP DOOR WILL BE CREATED USING ELECTROMAGNETS TO REMOTELY DROP IN CAT FUR TO LIMIT THE EXTERNAL FACTORS THAT MAY ALSO CAUSE FREEZING. WILDTYPE MICE ARE EXPECTED TO FREEZE WHEN PRESENTED WITH CAT FUR WHILE THE KNOCKOUT MICE SHOULD NOT. THE ABILITY TO BE CLASSICALLY CONDITIONED SHOULD BE PRESENT IN WILDTYPE MICE BUT LOST IN THE KNOCKOUT. STUDYING THE MECHANISMS OF INNATE AND CONDITIONED FEAR RESPONSES IN MICE WILL HELP US BETTER UNDERSTAND HUMAN FEAR RESPONSES.

MORGAN CHOATE, STATISTICS

FACULTY MENTOR(S): JENNIFER SYVERTSEN

MEDICINE IN THE METAPHYSICAL: WITCHCRAFT AS A FORM OF HEALING DURING THE COVID-19 PANDEMIC

THE USE OF RITUAL FOR AN INTENDED PURPOSE, OR WITCHCRAFT, IS A PRACTICE THAT IS SO DEEPLY INGRAINED IN THE HUMAN EXPERIENCE THERE IS NO KNOWN DATE OF ORIGINATION. YET, FOR A PRACTICE AS UNIVERSALLY ACKNOWLEDGED AS WITCHCRAFT, NOT MUCH IS KNOWN ABOUT THE WAY SPELLS OR METAPHYSICAL OBJECTS ARE UTILIZED TO HEAL THE HUMAN MIND AND BODY. IN RESPONSE TO THE COVID-19 PANDEMIC, NEO-PAGANISM AND NEW AGE WITCHCRAFT BECAME NOTABLY USED AS A FORM OF ALTERNATIVE AND COMPLEMENTARY MEDICINE DUE TO THE INCREASED SPREAD OF RELEVANT INFORMATION ON SOCIAL MEDIA PLATFORMS AND INCREASING STRESS SURROUNDING MEDICAL CARE. WHILE THERE ARE MANY REASONS ONE MIGHT TURN TO FORMS OF WITCHCRAFT FOR HEALING, BOTH EMOTIONALLY AND PHYSICALLY, IT IS DIFFERENT FOR EVERYONE. USING AN IN-DEPTH CASE STUDY INTERVIEW AND PARTICIPANT OBSERVATIONS, I DISCUSS THE IMPORTANCE OF INDIVIDUAL IDENTITY AND INFORMATION EQUITY IN THE CONTEXT OF THE CURRENT GLOBAL PANDEMIC. ADDITIONALLY, I ASSERT THAT HEALING, MUCH LIKE SOCIAL MEDIA ENGAGEMENT, IS A FORM OF SELF-EXPRESSION THAT CAN ADAPT TO STRESS OR PRESSURE. MY FINDINGS THROUGH THESE DISCUSSIONS REVEAL THE INTERSECTIONS BETWEEN PAGANISM, RACE, AND QUEERNESS IN TERMS OF COMMUNITY HEALING FROM OPPRESSIVE SYSTEMS THAT HAVE BEEN HIGHLIGHTED DURING THE COVID-19 PANDEMIC. WITCHCRAFT AND HEALING BEHAVE IN SIMILAR WAYS, INTERACTING WITH EACH OTHER AND LARGER SOCIAL CONCEPTS. BY EMPHASIZING THESE INTERACTIONS AND THEIR EFFECTS ON PRACTITIONERS, I SUGGEST ALTERNATIVE TREATMENTS OF SPIRITUALITY IN THE PUBLIC SPHERE TO CULTIVATE AN INCLUSIVE ENVIRONMENT OF SELF-EXPRESSION.

ALEXANDER CLARK, PHYSICS

FACULTY MENTOR(S): ROYA ZANDI

RELAXATIONAL DYNAMICS OF CAPSID CONVERSIONS

IN ORDER TO MATCH EXPERIMENTAL DATA REGARDING SELF-ASSEMBLY BEHAVIORS OF PROTEIN SHELLS IN A PLANT VIRUS, COWPEA CHLOROTIC MOTTLE VIRUS (CCMV), WE FIRST CONSIDERED HOW A SOLUTION OF COAT PROTEINS IN EQUILIBRIUM RELAXES AFTER EXPERIENCING AN ENVIRONMENTAL SHOCK. THE MODEL WE DEVELOPED IS BASED ON THE KINETIC THEORY OF VIRUS CAPSID ASSEMBLY. WE HAVE EXPANDED IT TO CONSIDER TWO DIFFERENT SIZES OF PROTEIN SHELLS AND THE CONVERSIONS BETWEEN THEM IN TERMS OF THE RATIO OF THE FORMATION RATES. WE HAVE FOUND THAT THE INITIAL RESPONSE OF THE SYSTEM SHOWS AN INCREASE IN THE CONCENTRATION OF THE SPECIES BEFORE RELAXATION TAKES PLACE. ADDITIONALLY, THE EXTREME LIMITS OF OUR MODEL APPROACH THE SITUATIONS PRESENTED BY THE KINETIC THEORY OF VIRUS CAPSID ASSEMBLY. THE MODEL HAS BEEN GENERALIZED TO ALLOW FOR THE COMPARISON OF ANY TWO SIZES OF PROTEIN SHELLS. THIS GENERALIZATION WILL ALLOW EXPERIMENTS TO BE CONDUCTED THAT COULD ALLOW FOR NEW VARIANTS OF PROTEIN AGGREGATIONS TO BE OBSERVED IN OTHER VIRUS SPECIES.

KEONNY COSEK, BIOCHEMISTRY

FACULTY MENTOR(S): DAWN NAGEL

CHARACTERIZING HSFC1 PROTEIN INTERACTION IN-PLANTA

HEAT SHOCK TRANSCRIPTION FACTORS (HSF) ARE PROTEINS THAT BIND TO SPECIFIC DNA SEQUENCES TO REGULATE THE EXPRESSION OF HEAT SHOCK PROTEINS (HSPs) IN RESPONSE TO EXTERNAL ABIOTIC STRESSORS. HSFs ARE CONSERVED ACROSS MULTIPLE ORGANISMS INCLUDING PLANTS AND ANIMALS. IN ARABIDOPSIS THALIANA, THERE ARE 3 HSF CLASSES, HSF A ACTIVATES TRANSCRIPTION, HSF B REPRESSES TRANSCRIPTION, AND HSF C'S FUNCTION IS NOT YET COMPLETELY UNDERSTOOD. PREVIOUS DATA SUGGEST THAT HSFC1 ACCUMULATES TRANSCRIPT DURING COLD STRESS COMPARED TO AMBIENT TEMPERATURES. TO FURTHER UNDERSTAND THE FUNCTIONAL ASPECTS OF HSFC1 IN RESPONSE TO COLD STRESS, A YEAST TWO-HYBRID (Y2H) ASSAY WAS PERFORMED UTILIZING A TRANSCRIPTION FACTOR LIBRARY, AND HSFC1 WAS DETERMINED TO INTERACT WITH ~20 TFs. WE THEN CREATED A SHORTLIST BY SELECTING 5 OF THE STRONGEST INTERACTORS THAT ALSO SHOWED SIMILAR EXPRESSION AND RESPONSE TO COLD STRESS AS HSFC1. IN THIS PROJECT, I AM USING ESTABLISHED PROTEIN-PROTEIN INTERACTION ASSAYS IN-PLANTA TO CONFIRM IF THESE 5 TFs (BHLH87, ADA2A MYB-RELATED, HSFA7A, TCP13, AND IDD15) INDEED INTERACT WITH HSFC1 IN RESPONSE TO COLD STRESS. THE RESULTS FROM THESE ASSAYS WILL NOT ONLY CONFIRM THE Y2H DATA BUT ALSO ELABORATE ON HOW HSFC1 MAY REGULATE THESE TFs. FUTURE FUNCTIONAL ANALYSIS WILL HELP TO DISCERN HOW HSFC1 IS FUNCTIONING WITHIN THE PLANT DURING TEMPERATURE STRESS AND CONTRIBUTE TO OUR UNDERSTANDING OF PLANT THERMOTOLERANCE.

BEATRICE DIEP, BIOCHEMISTRY, PLANT BIOLOGY

FACULTY MENTOR(S): CAROLYN RASMUSSEN

ABNORMAL TANGLED1 LOCALIZATION CORRELATES WITH ABNORMAL PREPROPHASE BAND FORMATION IN THE ZEA MAYS DCD1 MUTANTS

PROPER CELL DIVISION PLANE ORIENTATION IS IMPORTANT FOR GROWTH AND DEVELOPMENT IN MANY MULTICELLULAR ORGANISMS. PLANTS ARE UNIQUE IN THAT THE DIVISION SITE IS ESTABLISHED BEFORE MITOSIS BEGINS VIA THE PREPROPHASE BAND (PPB), A CORTICAL RING OF MICROTUBULES THAT FORMS WHERE THE CELL WALL WILL BE PLACED. IT WILL EVENTUALLY DISASSEMBLE TO FORM THE METAPHASE SPINDLE. IN TELOPHASE, THE PHRAGMOPLAST, A PLANT SPECIFIC STRUCTURE THAT GUIDES NEW CELL WALL FORMATION, WILL EXPAND TOWARDS THE

LOCATION SPECIFIED BY THE PPB. SEVERAL DIVISION PROTEINS MAINTAIN THAT LOCATION AFTER PPB DISASSEMBLY. ONE OF THEM IS CALLED TANGLED1 (TAN1), WHICH COLOCALIZES WITH THE PPB AND REMAINS THERE TO GUIDE THE PHRAGMOPLAST TO THE LOCATION DETERMINED BY THE PPB. PREVIOUS EXPERIMENTS HAVE SHOWN THAT THE PPB IS REQUIRED FOR TAN1 RECRUITMENT IN ARABIDOPSIS THALIANA AND TOBACCO. IN MAIZE, DISCORDIA1 (DCD1) AND ALTERNATIVE DISCORDIA1 (ADD1) ARE REDUNDANT GENES THAT ENCODE A PHOSPHATASE REGULATORY SUBUNIT ESSENTIAL FOR PPB FORMATION. DCD1 ADD1 DOUBLE MUTANTS LACK PPBS AND TAN1 FAILED TO ACCUMULATE UNTIL LATE TELOPHASE, DEMONSTRATING THAT THE PPB IS REQUIRED FOR EARLY TAN1 RECRUITMENT. HERE, DCD1 SINGLE MUTANTS, WHICH HAVE ASYMMETRIC DIVISION DEFECTS AND ABNORMAL PPBS, WERE ANALYZED TO FURTHER INVESTIGATE TAN1 LOCALIZATION AND ITS RELATIONSHIP WITH THE PPB. TAN1 LOCALIZATION PATTERNS WERE VARIABLE, WHICH CORRELATES WITH DEFECTS IN PPB ORGANIZATION. DEFECTIVE PPB FORMATION ALSO INFLUENCED PHRAGMOPLAST GUIDANCE. WE WILL USE THIS PARTIAL LOSS OF FUNCTION MUTANT TO DETERMINE WHEN AND HOW TAN1 IS RECRUITED TO THE DIVISION SITE TO BETTER UNDERSTAND TAN1'S FUNCTION IN DIVISION PLANE ORIENTATION.

EMIL DOMINGUEZ, BIOCHEMISTRY

FACULTY MENTOR(S): KEVIN KOU

THE TOTAL SYNTHESIS OF SPIROALANFURANTONES A-D

SPIROALANFURANTONES A-D ARE BIOLOGICALLY ACTIVE NATURAL PRODUCTS OF THE SESQUITERPENE LACTONE SUBCLASS EUDESMANOLIDE, CONTAINING A UNIQUE 6/6/5/5/5 PENTACYCLIC STRUCTURE NEVER BEFORE OBSERVED IN NATURE. RECENT STUDIES INTO THE BIOLOGICAL ACTIVITY OF THESE NATURAL PRODUCTS DEMONSTRATE LIPOPOLYSACCHARIDE-INDUCED NITRIC OXIDE INHIBITION IN RAW264.7 MACROPHAGES, INCREASING THE EFFICACY OF CURRENTLY AVAILABLE TREATMENTS AGAINST LYMPHOMA, LEUKEMIA, AND MYELOMA BY HALTING THE PROGRESSION OF THESE HEMATOLOGICAL MALIGNANCIES.

SPIROALANFURANTONES A-D WERE FIRST IDENTIFIED FROM THE ROOTS OF THE INULA HELENIUM WITH OPTIMAL CONDITION ISOLATION ATTEMPTS RESULTING IN POOR YIELDS. THIS HAS DRIVEN OUR RESEARCH GROUP TO DEVELOP A ROBUST TOTAL SYNTHESIS PATHWAY THAT WILL ALLOW FOR APPRECIABLE AMOUNTS OF THESE COMPOUNDS TO BE SYNTHESIZED FOR FURTHER MEDICAL RESEARCH. OUR SYNTHETIC ROUTE BEGINS WITH A COMMERCIALY AVAILABLE FURAN AND UTILIZES CLASSICAL AND ATYPICAL TRANSFORMATIONS TO ACCESS ISOALANTOLACTONE AND ALANTOLACTONE IN SIGNIFICANTLY FEWER STEPS THAN THE CURRENT SYNTHESIS IN THE LITERATURE. WE PLAN TO USE ISOALANTOLACTONE AND ALANTOLACTONE AS THE BASE SCAFFOLD FOR SPIROALANFURANTONES A-D.

JUSTIN EDWARDS, BIOCHEMISTRY

FACULTY MENTOR(S): SEAN LEARY

DECIPHERING HOW SARS-CoV-2 NUCLEOCAPSID PROTEIN IMPACTS EIF4F-DEPENDENT TRANSLATION INITIATION.

UNDERSTANDING THE DYNAMICS OF CORONAVIRUS LIFE CYCLES REMAINS A VITAL GOAL OF MUCH OF THE SCIENTIFIC COMMUNITY AFTER THE EVENTS OF THE SARS-CoV-2 PANDEMIC. THE GOAL OF THIS PROJECT IS TO UNDERSTAND HOW CORONAVIRUS NUCLEOCAPSID (N) PROTEIN IMPACTS HUMAN AND VIRAL PROTEIN SYNTHESIS ("TRANSLATION") THROUGH EFFECTS ON THE HUMAN PROTEIN EIF4F. EIF4F IS A MULTICOMPONENT PROTEIN THAT CONTROLS RATES OF TRANSLATION INITIATION BY BINDING MESSENGER RNA MOLECULES. PAST STUDIES HAVE SUGGESTED THAT N PROTEIN PERTURBS EIF4F FUNCTION TO SUPPRESS TRANSLATION, BUT THE MOLECULAR MECHANISMS OF THIS EFFECT REMAIN UNCLEAR. WE WILL FIRST OPTIMIZE A METHOD TO PURIFY SARS-CoV-2 N PROTEIN FROM BACTERIAL CELLS. THEN, ONCE THE PROTEIN IS ISOLATED WE WILL CHARACTERIZE ITS INTERACTIONS WITH DIFFERENT EIF4F SUBUNITS. N PROTEIN ALSO INTERACTS WITH RNA MOLECULES AS PART OF ITS NORMAL FUNCTION. WE WILL ESTABLISH THE SELECTIVITY OF N-PROTEIN BINDING TO CORONAVIRUS AND HUMAN RNAs. FINALLY, WE WILL USE SINGLE-MOLECULE FLUORESCENCE MICROSCOPY TO OBSERVE HOW N PROTEIN AFFECTS THE REAL-TIME

INTERACTIONS OF EIF4F WITH HUMAN AND VIRAL MESSENGER RNAs. AS AN OUTCOME OF THIS PROJECT WE WILL ESTABLISH A QUANTITATIVE PHYSICAL MODEL FOR HOW N PROTEIN MODULATES TRANSLATION INITIATION TO PROMOTE VIRAL REPLICATION. THE INSIGHTS WE GAIN MAY AID EFFORTS TOWARD IMPROVED TREATMENTS FOR CORONAVIRUS INFECTION.

MARIA ESPARZA, BIOLOGY

FACULTY MENTOR(S): DAVID REZNICK

CHARACTERISTIC OF COMMON RACE HORSE FRACTURES

HORSE RACING HAS BEEN A FAVORITE PASTIME FOR MANY INDIVIDUALS DATING BACK TO AS EARLY AS THE FIRST OLYMPIC GAMES IN GREECE. IT CAN BE A VERY PROFITABLE SPORT, IF YOUR LUCK IS GOOD, AND EVERYONE CAN BE A WINNER, BUT AT WHOSE EXPENSE? HORSES ARE OFTEN SEEN AS MAJESTIC STOIC CREATURES THAT HAVE ALWAYS BEEN PRAISED FOR THEIR USEFULNESS. THEIR STRENGTH AND MOBILITY ARE DUE TO THEIR STRUCTURE BUT COMES AT A COST. IN HORSE RACING THE LEADING CAUSE OF DEATH IS FRACTURES. IN THE RACEHORSE INDUSTRY HORSES WITH FRACTURES ARE OFTEN PUT DOWN BECAUSE THE LIKELIHOOD OF RECOVERY IS SLIM TO NONE. MUSCULOSKELETAL INJURIES ARE UNDERGOING RESEARCH AT CALIFORNIA HORSE RACING BOARD (CHRB) OF UNIVERSITY OF CALIFORNIA DAVIS IN HOPES OF UNDERSTANDING AND PROVIDING PREVENTATIVE MEASURES TO REDUCE THE INJURIES. IN THIS PAPER WE EXPLORE THE MUSCULOSKELETAL CASES THAT HAVE COME THROUGH THE CALIFORNIA ANIMAL HEALTH AND FOOD SAFETY (CAHFS) LABORATORY IN SAN BERNARDINO FROM THE PAST 5 YEARS, AND SEE IF THE SEX, AGE AND BREED HAVE AN EFFECT ON THE TYPE OF FRACTURES THAT OCCUR IN THESE HORSES.

DOROTHY ESTRADA, CELL, MOLECULAR AND DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): MONICA CARSON

SEX-SPECIFIC INFLAMMATORY RESPONSES TO LPS-INDUCED ACUTE SYSTEMIC INFLAMMATION IN THE MOUSE JEJUNUM

THE JEJUNUM IS THE SECOND SEGMENT OF THE SMALL INTESTINE THAT ABSORBS NUTRIENTS AND SOLUTES, WHILE KEEPING THE PERITONEUM STERILE BY CONFINING LUMINAL BACTERIA. INCREASED TISSUE PERMEABILITY CAN ALLOW LUMINAL BACTERIA TO ENTER THE PERITONEUM, TRIGGERING INFLAMMATORY RESPONSES IN THE TISSUE. HERE, WE SEEK TO UNDERSTAND SEX-SPECIFIC DIFFERENCES IN THE MECHANISMS OF ACUTE SYSTEMIC INFLAMMATORY RESPONSES IN MICE AFTER INTRAPERITONEAL INJECTION OF LIPOPOLYSACCHARIDE (IP-LPS). PERITONEAL IMMUNE CELLS LIKE MACROPHAGES AND NEUTROPHILS RECOGNIZE LPS AND RELEASE INFLAMMATION-INDUCING SIGNALS VIA THE TOLL-LIKE RECEPTOR 4 (TLR4) PATHWAY, WHICH CAN IMPACT JEJUNUM TISSUE FUNCTION. WE COMPARED MALE AND FEMALE INFLAMMATORY RESPONSES BY ANALYZING CLAUDIN 3 (CLDN3) TIGHT JUNCTION PROTEIN DISLOCATION, DIFFERENTIAL GENE EXPRESSION, IMMUNE CELL COUNT, AND CHANGES IN TISSUE PERMEABILITY VIA TRANSEPITHELIAL ELECTRICAL RESISTANCE (TEER) ASSAY. WE DEMONSTRATED THAT FEMALES RESPONDED MORE ROBUSTLY 24H POST-IP-LPS INJECTION BY SHOWING CLDN3 PUNCTA INTERNALIZATION- A MEASURE CORRELATED WITH INFLAMMATORY RESPONSE - DECREASED TEER, AND INCREASED TISSUE PERMEABILITY TO 4kDa MOLECULES. GENE EXPRESSION ANALYSIS SHOWED UPREGULATION OF CXCL5, ENCODING FOR MONOCYTE AND NEUTROPHIL RECRUITMENT IN BOTH SEXES. HOWEVER, ONLY IN FEMALE MICE WAS CXCL5 ACCOMPANIED BY CCL2, CCL8, CXCL9, AND OTHER GENES INVOLVED IN INFLAMMATORY RESPONSE AND OXYGEN SPECIES RELEASE. WE ANALYZED MACROPHAGE RECRUITMENT IN BOTH SEXES BUT ONLY FEMALES SHOWED INCREASED CCR2+ CELLS IN THE JEJUNUM. FURTHER ANALYSIS OF SEX-SPECIFIC DIFFERENCES IN THE TISSUE POST-IP-LPS INJECTION SUCH AS GLUCOSE ABSORPTION, AN ESSENTIAL FUNCTION OF THE JEJUNUM, IS REQUIRED TO BETTER UNDERSTAND THE EFFECT OF INFLAMMATION IN TISSUE FUNCTION.

KEVIN FLORES, ENTOMOLOGY

FACULTY MENTOR(S): QUINN MCFREDERICK

WHO IS HOME IN THE MICROBIOME? PHENOLOGICAL ANALYSIS OF BEE GUT MICROBIAL COMMUNITIES IN THE CENTRAL VALLEY CALIFORNIA

BEES HOST A COMMUNITY OF MICROBES WITHIN THEIR GUTS THAT CAUSE BOTH DAMAGING AND BENEFICIAL EFFECTS, INCLUDING PATHOGENICITY, DETOXIFICATION, AND NUTRITIONAL SUPPLEMENTATION. SINCE MICROBIAL COMMUNITIES IMPACT BEE HEALTH, IT'S CRITICAL TO UNDERSTAND WHAT FACTORS CONTRIBUTE TO VARIATION IN BEE GUT MICROBIAL COMMUNITIES. IT HAS BEEN SUGGESTED THAT BEES ACQUIRE MICROBES THROUGH FORAGING SINCE BOTH FLOWERS AND BEES HARBOR SIMILAR MICROBES. TO FURTHER SUPPORT THIS IDEA AND ILLUSTRATE A DRIVER OF MICROBIAL COMMUNITY VARIATION, SCIENTISTS FOUND POLLEN USAGE AND GENERAL FUNGAL COMMUNITIES CO-VARYING WITH LANDSCAPE VARIATION. HOWEVER, LANDSCAPE VARIATION IS ONLY ONE FACTOR. RECENT STUDIES SHOW THAT PLANT-BEE COMMUNITIES ARE NOT STATIC ENTITIES. INTERACTION TURNOVER OCCURS IN A PLANT-BEE COMMUNITY, MEANING PLANT-BEE INTERACTIONS CHANGE AS FLOWERS AND DIFFERENT SPECIES OF BEES COME AND GO. KNOWING THAT FLOWERS ACT AS TRANSMISSION HUBS, VARIATION IN MICROBIAL COMMUNITIES MAY FOLLOW INTERACTION TURNOVER. CONSIDERING THIS IDEA, WE ASKED HOW PHENOLOGY CONTRIBUTES TO MICROBIAL COMMUNITY VARIATION? TO INVESTIGATE, WE ARE USING QIIME 2 TO ANALYZE GUT MICROBIAL COMMUNITIES GATHERED FROM BEES COLLECTED IN THE CENTRAL VALLEY OF CALIFORNIA. WE HYPOTHESIZE MICROBIAL COMMUNITIES IN BEE GUTS WILL VARY BETWEEN THREE DIFFERENT FORAGING PERIODS OF THE FLOWERING SEASON (BEFORE, DURING, AND AFTER ALMOND FARM BLOOMING) SINCE PLANT-BEE COMMUNITIES DRASTICALLY SHIFT AS MILLIONS OF HONEY BEES ARE BROUGHT OVER DURING ALMOND TREE BLOOMING. PRELIMINARY RESULTS OF HONEY BEE MICROBIAL COMMUNITIES SHOW MINIMAL VARIATION, WHICH IS EXPECTED SINCE HONEY BEES MAINTAIN STRICT MICROBIOMES. HOWEVER, ANALYSES ARE ONGOING AND WE HOPE TO FORWARD OUR UNDERSTANDING OF BEE GUT MICROBIAL COMMUNITY ECOLOGY.

KATHLEEN FONG, ENVIRONMENTAL SCIENCES

FACULTY MENTOR(S): WILLIAM PORTER

WAREHOUSE DEVELOPMENT AND HEAVY DUTY TRUCKS IN THE INLAND EMPIRE: TRENDS, CONNECTIONS, AND ENVIRONMENTAL JUSTICE IMPLICATIONS

IN RECENT YEARS, THE GROWING ECOMMERCE MARKET HAS RESULTED IN A PROLIFERATION OF WAREHOUSES IN THE INLAND EMPIRE, ALONGSIDE A CORRESPONDING GROWTH OF HEAVY DUTY TRUCK FLEETS TO ACCOMMODATE FOR THIS INCREASE IN WAREHOUSE ACTIVITY. THESE INCREASES IN WAREHOUSE DEVELOPMENT AND HEAVY DUTY TRUCK POPULATIONS IN LOW-INCOME COMMUNITIES CAN BRING ABOUT NEGATIVE ENVIRONMENTAL AND HUMAN HEALTH CONSEQUENCES ASSOCIATED WITH INCREASED TRANSPORT EMISSIONS AND REDUCED AMBIENT AIR QUALITY. THUS, WHILE THIS TYPE OF EXPANSION IN RESPONSE TO MARKET DEMANDS MAY BRING REGIONAL ECONOMIC BENEFITS, IT ALSO CARRIES PUBLIC HEALTH AND ENVIRONMENTAL JUSTICE IMPLICATIONS AS IT ADDS HEALTH BURDENS UPON ALREADY VULNERABLE POPULATIONS. FURTHERMORE, EXPOSED POPULATIONS GENERALLY HAVE LITTLE TO NO DIRECT INFLUENCE ON HEAVY DUTY TRUCK OPERATIONS, MAKING THEIR IMPACTS OF CONCERN FROM AN ENVIRONMENTAL JUSTICE PERSPECTIVE. WITH THIS RESEARCH, WE EXAMINE THE SPATIOTEMPORAL TRENDS AND PATTERNS OF WAREHOUSES AND HEAVY DUTY TRUCK TRAFFIC ACROSS REGIONS IN CALIFORNIA, ESTIMATE THE CONSEQUENCES THESE FINDINGS MAY HAVE ON VULNERABLE POPULATIONS, AND EXAMINE ANY POTENTIAL DISPROPORTIONATE EMISSION EXPOSURE ACROSS SUBAREAS BY HEAVY DUTY TRUCK FLEETS.

ANDREA GARNICA, BIOLOGY

FACULTY MENTOR(S): KERRY MAUCK

ALTERNATIVE REARING METHODS AND DIETS FOR BLACK SOLDIER FLIES

FOOD WASTE NEGATIVELY AFFECTS OUR ECONOMY, FOOD SYSTEMS, AND ENVIRONMENT. TO LESSEN THESE EFFECTS, THERE IS A PUSH TO USE LIVING RECYCLERS TO CONVERT FOOD WASTE INTO USABLE PRODUCTS. ONE SUCH RECYCLER, BLACK SOLDIER FLY LARVAE (BSFL), CAN CONVERT A WIDE RANGE OF FOODS INTO FERTILIZER, AND CAN ALSO BE USED AS AN ALTERNATIVE TO ANIMAL FEED. DUE TO THEIR BIOCONVERSION OF WASTE, BSFL ARE IDEAL WASTE MANAGERS. HOWEVER, THERE ARE MANY LIMITATIONS TO LARGE-SCALE FARMING OF BSF WHICH MAKE THEIR IMPLEMENTATION AS RECYCLERS CHALLENGING. ADDITIONALLY, THERE REMAIN MANY RELEVANT FOOD WASTES WHICH HAVE YET TO BE TESTED. TO ADDRESS THESE TWO ISSUES, ALTERNATIVE WAYS OF MONITORING HUMIDITY AND ENSURING AERATION AIMED AT REDUCING MANUAL LABOR WILL BE TESTED, AS WELL AS THE EFFECTS OF COFFEE GROUNDS AND COFFEE SILVER SKINS IN COMBINATION AND IN ADDITION TO OTHER FOOD WASTE, ON BSFL DEVELOPMENT. THUS FAR, OUR FINDINGS SHOW THAT LESS LABOR INTENSIVE MAINTENANCE OF BSF REARING IS POSSIBLE. BSF REARED WITHOUT DAILY MONITORING (IE: AERATION AND THE ADDITION OF WATER) SHOWED SIMILAR GROWTH AND DEVELOPMENT WHEN COMPARED TO BSF FROM TRADITIONAL REARING METHODS. ALTHOUGH MORE TESTING IS NEEDED TO DETERMINE THE CONSISTENCY OF THESE RESULTS, THIS IS A CRUCIAL STEP TO ENABLING THE USE OF BSFL AS CONVERTERS OF FOOD WASTE FROM SMALL-SCALE TO INDUSTRIAL OPERATIONS.

RYAN GATES, BIOCHEMISTRY

FACULTY MENTOR(S): ERNEST MARTINEZ

ESTABLISHMENT OF A NOVEL MECHANISM OF MYC ACETYLATION BY ATAC

THE RECOGNITION OF MODIFIED AMINO ACID RESIDUES BY "READER" PROTEINS IS KEY TO THE INTRACELLULAR MECHANISMS REGULATING MANY GENE TRANSCRIPTION PROCESSES INTEGRAL TO CANCER DISEASE PROGRESSION. HERE, I PROPOSE TO INVESTIGATE A NOVEL INTRACELLULAR INTERACTION BETWEEN THE ATAC COMPLEX'S "READER" PROTEIN, YEATS2, AND THE MYC ONCOPROTEIN INVOLVING YEATS2 BINDING TO KEY ACETYLATED LYSINE (ACK) AMINO ACID RESIDUES OF MYC. I WILL ESTABLISH THIS MECHANISM AND ITS ROLE IN MYC ACK SIGNALING THROUGH A SERIES OF BIOCHEMICAL AND BIOINFORMATIC ANALYSES. THIS DISCOVERY MAY PROVIDE NEW TARGETS FOR ANTICANCER DRUG DEVELOPMENT WHICH WILL BE INVESTIGATED WITH OUR COLLABORATORS AT THE CITY OF HOPE COMPREHENSIVE CANCER CENTER.

RAFIK GEWAID, BIOLOGY

FACULTY MENTOR(S): NICHOLAS DIPATRIZIO

DETERMINING THE OPTIMAL TIME-DEPENDENT GENETIC DELETION OF THE CANNABINOID RECEPTOR IN ADIPOSE TISSUE

OBESITY IS A CHRONIC DISEASE CHARACTERIZED BY EXCESSIVE ADIPOSE TISSUE ACCUMULATION AND IS COMMONLY ASSOCIATED WITH TYPE-2 DIABETES, HEART DISEASE, AND HYPERLIPIDEMIA. DURING OBESITY, SEVERAL METABOLIC PROCESSES BECOME DYSREGULATED AS A CONSEQUENCE OF EXCESS FAT ACCUMULATION, INCLUDING THE ENDOCANNABINOID SYSTEM WHICH IS HEAVILY INVOLVED IN REGULATING APPETITE AND OVERALL ENERGY HOMEOSTASIS. ACTIVATION OF CANNABINOID SUBTYPE-1 RECEPTORS (CB1RS) WITHIN ADIPOSE TISSUE PROMOTES FAT ACCUMULATION AND EXPANSION, THUS SERVING AS A POTENTIAL THERAPEUTIC TARGET TO TREAT OBESITY. BY USING A MOUSE MODEL OF DIET-INDUCED OBESITY, OUR RESEARCH GROUP STUDIES THE ROLE OF CB1RS IN THE DEVELOPMENT OF OBESITY DURING

ADULTHOOD. FURTHERMORE, WE UTILIZE CRE-LOX RECOMBINATION TECHNOLOGY TO INVESTIGATE THE IMPACT OF CB1R GENETIC DELETION EXCLUSIVELY WITHIN ADIPOSE TISSUE. THIS GENETIC TOOL ALLOWS RESEARCHERS TO DELETE GENES OF INTEREST IN A TIGHTLY-REGULATED TEMPORAL MANNER. MOREOVER, THIS TECHNOLOGY ENABLES EXAMINATION OF ROLES FOR CB1RS IN ADIPOSE TISSUE DEVELOPMENT AND THEIR ROLES IN CONTROL OF ENERGY HOMEOSTASIS. HOWEVER, MICE DEVELOP ADIPOSE TISSUE RAPIDLY DURING ADOLESCENCE, THEREBY MAKING THE TIMING OF GENETIC KNOCKOUT CRITICAL FOR EFFECTIVE CB1R DELETION. TO INVESTIGATE THE EFFICIENCY OF GENETIC DELETION DURING DEVELOPMENT OF ADIPOSE TISSUE IN ADULT MALE MICE, MY RESEARCH IS FOCUSED ON ELUCIDATING THE OPTIMAL TIME WINDOW FOR EFFECTIVE CB1R DELETION. INITIATING GENETIC DELETION WILL OCCUR IN MICE 4 TO 6 WEEKS-OF-AGE TO COMPARE THE EFFICACY OF CB1R DELETION WITH RESPECT TO ANIMAL AGE AT LATER TIMEPOINTS. WE HYPOTHESIZE THAT EFFICIENCY OF ADIPOSE-SPECIFIC CB1R GENE DELETION WILL BE TIME-DEPENDENT, WITH EARLIER GENETIC DELETION LEADING TO LOWER CB1R EXPRESSION.

RAMTIN GHAFORI, BIOLOGY

FACULTY MENTOR(S): MICHAEL ADAMS

INFLUENCE OF ECDYSIS TRIGGERING HORMONE ON MALE COURTSHIP BEHAVIOR IN THE FRUIT FLY, *DROSOPHILA MELANOGASTER*

THERE ARE VARIOUS EXTERNAL AND INTERNAL FACTORS THAT INFLUENCE COURTSHIP BEHAVIOR OF THE FRUIT FLY, *DROSOPHILA MELANOGASTER*. ECDYSIS TRIGGERING HORMONE (ETH), SECRETED BY INKA CELLS, IS AN INTERNAL FACTOR THAT MAY INFLUENCE MALE COURTSHIP BEHAVIOR. IN FACT, A PREVIOUS STUDY IN THE ADAMS LAB FOUND THAT ETH INJECTION HAS AN INHIBITORY EFFECT ON COURTSHIP BEHAVIOR. HOWEVER, THE CONCENTRATION OF INJECTED ETH WAS WELL ABOVE ESTIMATED PHYSIOLOGICAL LEVELS. IN THIS STUDY, I AM INVESTIGATING HOW NATURAL ETH RELEASE FROM INKA CELLS INFLUENCES *DROSOPHILA* COURTSHIP BEHAVIOR. THIS STUDY WILL INCREASE UNDERSTANDING OF HOW HORMONAL STATE INFLUENCES REPRODUCTIVE BEHAVIOR. I AM USING THE LIGHT-GATED RED-LIGHT ACTIVATED CHANNELRHODOPSIN EXPRESSED IN INKA CELLS TO CAUSE NATURAL RELEASE OF ETH. UPON LIGHT ACTIVATION, CALCIUM IONS ENTER THE CELL, CAUSING ETH RELEASE FROM INKA CELLS VIA EXOCYTOSIS. THE EFFECT OF INCREASED ETH RELEASE ON COURTSHIP BEHAVIOR IS ASSESSED BY COMPARING COURTSHIP INDEXES, OR THE PERCENTAGE OF TIME DURING A 10-MINUTE INTERVAL THAT THE MALE FRUIT FLY PURSUES THE VIRGIN FEMALE. THE EXPECTED OUTCOME OF THIS STUDY IS THAT A RISE IN ETH LEVEL LEADS TO COURTSHIP INHIBITION, SO THE COURTSHIP INDEX OF THE *DROSOPHILA MELANOGASTER* EXPOSED TO RED LIGHT WILL BE LOWER THAN THAT OF THE CONTROL EXPERIMENT.

ALEXANDRIA GRAHAM, BIOLOGY

FACULTY MENTOR(S): KIMBERLEY LAKES

DETERMINING IF CANINES EXHIBIT STRESS-RELATED RESPONSES WHEN PARTICIPATING IN THERAPEUTIC INTERACTIONS WITH CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD)

THIS STUDY DESCRIBES BEHAVIORAL RESPONSES OF CANINES DURING CLINICAL RESEARCH STUDYING AN ANIMAL-ASSISTED INTERVENTION (AAI) FOR CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD). WHILE AAI HAS BEEN FOUND TO IMPROVE TREATMENT OUTCOMES FOR THESE CHILDREN, THIS SETTING MAY INDUCE STRESS IN SOME DOGS, A POTENTIAL THREAT TO THEIR WELFARE. TWO THERAPY DOGS PARTICIPATED IN AAI SESSIONS WITH A GROUP OF 4 CHILDREN WITH ADHD IN THE FIRST COHORT OF A CLINICAL TRIAL PILOT STUDY. UTILIZING A NOVEL ETHOGRAM DEVELOPED IN EARLIER WORK, VIDEO RECORDINGS WERE CODED BY TWO CODERS WHO WERE BLIND TO THE AIMS OF THE STUDY AND MET INTER-RATER RELIABILITY ($r = .90$ TO $.96$). ONE-ZERO INTERVAL-SAMPLING OF TEN STRESS-ASSOCIATED BEHAVIORS FOR EACH DOG WAS CONDUCTED EVERY OTHER MINUTE FOR THE ENTIRE DURATION OF EACH SESSION (86.5 MINUTES \pm 6.5). SIMILAR TO PREVIOUS FINDINGS, DOGS DEMONSTRATED FEW STRESS-ASSOCIATED BEHAVIORS. ONLY TWO OF THE TEN STATE BEHAVIORS, "LICKING" AND "PANTING", EMERGED IN GREATER THAN 10% OF OBSERVED INTERVALS (.52 AND .78, RESPECTIVELY). THIS PRELIMINARY

DATA SUGGESTS EXPERIENCED THERAPY DOGS PARTICIPATING IN AAI WITH CHILDREN WITH ADHD DEMONSTRATE RELATIVELY FEW STATE BEHAVIORS OF STRESS WHEN STRUCTURED PROTOCOLS ARE IMPLEMENTED IN EFFORTS TO PROTECT THE SAFETY AND WELFARE OF THE DOGS, BUT THAT MORE WORK IS NEEDED TO BETTER ASSESS THE UTILITY OF THIS TOOL AND ANIMAL PARTICIPATION IN THESE SETTINGS. THESE DATA ON HUMAN-ANIMAL INTERACTION WILL HELP RESEARCHERS TO BETTER UNDERSTAND HOW AAI WITH DOGS CAN BE IMPLEMENTED SAFELY AND MINIMIZE STRESS ON THE DOG.

ANANYA GUNDLAPALLI, BUSINESS ADMINISTRATION, INFORMATION SYSTEMS

FACULTY MENTOR(S): ELAINE WONG, RAJ SINGH

INDUSION

RESEARCH HAS SHOWN THAT THE AMBIENCE IN A RESTAURANT PLAYS A SIGNIFICANT ROLE IN SHAPING CUSTOMERS' OVERALL DINING EXPERIENCE AND THE PERCEPTION OF THE RESTAURANT. THIS ALSO SHOWS THE CORRELATION BETWEEN INTERIOR LOOK OF A RESTAURANT TO SALES. THE FOOD CULTURE IN AMERICA LACKS RESTAURANTS WHICH SHOWCASE UNIQUE FOODS AND CUISINES WITH AN AESTHETIC MODERN TOUCH. TO COMBAT THIS, I INTRODUCE THE IDEA OF "INDUSION," WHICH REFERS TO DIFFERENT CUISINES WITH A UNIQUE INDIAN TWIST. I PLAN TO NAME MY RESTAURANT AFTER THIS IDEA "INDUSION". INDUSION IS A COMBINATION TERM OF THE WORDS INDO AND FUSION. INDUSION WILL FOCUS ON SELLING PRODUCTS WITH AN INDO FUSIONS TWIST. RESTAURANTS LIKE INDUSION ARE HARDER TO FIND IN MANY AREAS OF THE COUNTRY, ESPECIALLY ONES WITH UNIQUE AMBIENCE AND UNIQUE FOODS. FOR MY CAPSTONE, I WILL FOCUS ON DEVELOPING A BUSINESS PLAN THAT WILL CONSIST OF THE REQUIRED STEPS TO START AN INDO-FUSION RESTAURANT FROM THE GROUND UP. APART FROM THE BUSINESS PERSPECTIVE, THIS RESTAURANT WILL ALSO SHOWCASE A NON-ORDINARY MODERN INTERIOR UNLIKE MANY OTHER RESTAURANTS. INDUSIONS IS PLANNED TO OPEN UP IN SAN DIEGO COUNTY AND WILL APPLY VARIOUS MARKETING STRATEGIES SUCH AS SOCIAL MEDIA AND EMAIL MARKETING CAMPAIGNS. THE IMPORTANCE OF THIS BUSINESS PLAN IS TO CREATE A GUIDE ON WHAT INFORMATION IS NEEDED IN THE INITIAL STAGES OF STARTING A BUSINESS AS WELL AS HOW TO BUILD A SUSTAINABLE BUSINESS IN A HIGH-TURNOVER INDUSTRY. INDUSION WILL BECOME ONE OF THE LEADING INDIAN FUSION RESTAURANTS IN SAN DIEGO COUNTY.

JASMINE GWIZDALA, NEUROSCIENCE

FACULTY MENTOR(S): BRANDON BROWN

THE EFFECTIVENESS OF THE R' COURSE, "APPLICATIONS AND MODELS OF PUBLIC HEALTH: FOCUSING ON INLAND EMPIRE DEMOGRAPHICS"²

HEALTH LITERACY AND EDUCATION ARE SIGNIFICANT FACTORS THAT PLAY A ROLE IN ACCESS TO RELIABLE MEDICAL CARE. HEALTH LITERACY, THE ABILITY FOR AN INDIVIDUAL TO INTERPRET HEALTH INFORMATION AND MAKE INFORMED MEDICAL DECISIONS FOR THEMSELVES, IS THE PRIMARY FOCUS OF THIS PROJECT. DURING THE PANDEMIC, PUBLIC HEALTH HAS BEEN OF PARTICULAR FOCUS IN EFFORTS TO PROTECT AT-RISK COMMUNITIES. HOWEVER, THERE HAS BEEN A GREAT DEAL OF HEALTH MISINFORMATION WHICH DISPROPORTIONATELY AFFECTS MARGINALIZED COMMUNITIES SUCH AS LOW-INCOME FAMILIES AND PEOPLE OF COLOR. THIS STUDY DISSECTS DIFFERENT HEALTH TOPICS AND THE INFLUENCE OF HEALTH CARE EDUCATION THROUGH A STUDENT-RUN R' COURSE TITLED "APPLICATIONS AND MODELS OF PUBLIC HEALTH: FOCUSING ON INLAND EMPIRE DEMOGRAPHICS." COURSE TOPICS RANGE FROM SOCIAL DETERMINANTS OF HEALTH TO THE FIELD OF EPIDEMIOLOGY, WITH PARTICULAR EMPHASIS TO STUDY SOCIOECONOMICALLY DISADVANTAGED INLAND EMPIRE COMMUNITIES. IN ORDER TO ASSESS THE EFFECTIVENESS OF THE COURSE, STUDENTS' KNOWLEDGE AND UNDERSTANDING OF PUBLIC HEALTH TOPICS IS IDENTIFIED VIA A PRE-ASSESSMENT SURVEY, TAKEN PRIOR TO THE START OF COURSE INSTRUCTION WHICH IS REPLICATED WITH A POST-ASSESSMENT SURVEY. PRE-ASSESSMENT FINDINGS ARE COMPARED TO STUDENTS' POST-ASSESSMENT FINDINGS AT THE CONCLUSION OF THE COURSE. SOME QUESTIONS TO ASSESS THE LEVEL OF STUDENT KNOWLEDGE BEFORE THE CLASS AND COMPARE THESE FINDINGS TO STUDENT KNOWLEDGE AFTER THE CLASS INCLUDE: UNDERSTANDING THE DIFFERENCE BETWEEN MEDICINE AND PUBLIC HEALTH, BARRIERS THAT THE UNDERSERVED EXPERIENCE, AND PUBLIC HEALTH SERVICES IN THE INLAND EMPIRE. THIS STUDY PROVIDES FURTHER INFORMATION ABOUT HOW TO

OVERCOME HEALTH INEQUITIES AND DISPARITIES THROUGH EDUCATIONAL INITIATIVES.

USMAN HAMID, BIOLOGY

FACULTY MENTOR(S): RICHARD CARDULLO

CREATIVE WRITING

NOWADAYS, THE DEFINITION OF ETERNAL LOVE HAS BENT TO FIT MODERN-DAY COVETOUSNESS OF INTIMACY. DIFFERENT ERAS HAD DIFFERENT GENERATIONS WITH THEIR OWN VALUES AND DESIRES. THE INSTANT DESIRABILITY WENT TOO VAST TO A POINT THAT LOVE BECAME A BATTLE OF WANT AND NEED WHERE IT SHOULDN'T EITHER. THE CULTURE OF RENDEZVOUS TOOK OVER. FLING BECAME A NEW DEFINITION OF LOVE. THIS FICTITIOUS PLAYWRIGHT AIMS TO PRESENT TO READERS A TEST OF LOVE AS IT'S BEING PUT THROUGH UNCONVENTIONAL SITUATIONS. THE CIRCUMSTANCES WILL PUT THE CHARACTERS IN SITUATIONS WHERE THEY WILL BE ON A PERSONAL JOURNEY OF DISCOVERING AND ATTAINING LOVE. A TYPE OF LOVE CAPTURED IN WORDS THAT WILL MAKE THE READER HAVE A DIFFERENT VISION OF LOVE; A MARRIAGE BETWEEN THE IDEOLOGIES OF LOVE AND LOSS. THIS PROJECT SEEKS TO ANALYZE AND CLASH WITH THE COMMON PHRASE OF EVERYTHING BEING FAIR IN LOVE AND WAR. AFTER READING AND EXPLORING DIFFERENT ASPECTS OF LITERATURE, THIS STORY OF MINE WILL REVOLVE AROUND THE IDEA OF JUSTICE IN LOVE AND HATE. ONE'S DEFINITION OF LOVE AND HATE CAN INVALIDATE WHAT THE OTHER BELIEVES. THIS PLAY SPECIFICALLY FOCUSES ON A BACKWARD SOCIETY IN TODAY'S WORLD WITH FAMILIES DEEP-ROOTED IN THEIR TRADITIONS AND CUSTOMS. THE APPALLING CUSTOMS MAKE UP THE BACKBONE OF THE PATH THAT THE MAIN CHARACTERS ARE EXACTED TO WALK UPON. IN CONCLUSION, THIS PLAY WILL SHOW HOW SOMETIMES LOVE MIGHT NOT BE DESTINED FOR MARRIAGE, INSTEAD OF ABOUT SACRIFICE AND FACING HARDSHIPS THAT COME YOUR WAY.

NINA HAQ, BIOLOGY

FACULTY MENTOR(S): ALLISON HEDGE COKE

THE BEGINNING OF IT ALL

OUR WORLDS STOOD STILL, AS THE COVID-19 VIRUS TOOK HOLD OF US. IT EMPTIED OUR STREETS, SILENCED OUR CITIES, AND MADE US STRANGERS TO OURSELVES. BY EARLY MARCH 2020, COVID-19 WAS DECLARED A PANDEMIC BY THE WORLD HEALTH ORGANIZATION. BY THE END OF THE 2020, THERE WAS A GLIMPSE OF HOPE FOR SOME, WITH VACCINATIONS AGAINST SARS-CoV-2 BECOMING AVAILABLE IN A FEW COUNTRIES, BUT BY THEN, THERE WERE 83,832,334 CASES AND 1,824,590 DEATHS GLOBALLY. WE WERE ALL AFFECTED IN DIFFERENT WAYS DURING 2020. WE ALL EXPERIENCED IT, BUT EACH OF US HAD A DIFFERENT STORY. THERE ARE STORIES OF LOSS, DESPAIR, LONELINESS, BUT THERE IS ALSO HOPE ETCHED IN THE HOPELESSNESS THAT GRIPPED US. IT IS BOTH THE HOPEFULNESS AND HOPELESSNESS THAT I WANTED TO ENCAPSULATE IN MY POETRY. THEREFORE, THIS CAPSTONE PROJECT IS A POETRY COLLECTION THAT SPEAKS TO THAT YEAR, AND REFLECTS WHAT I FELT, SAW, LOST AND GAINED. IT CAPTURES A TIME, AND ACTS AS REMINDER OF HOW FAR WE HAVE COME, AND HOW MUCH FURTHER WE STILL HAVE TO GO.

BRANDON HOANG, NEUROSCIENCE

FACULTY MENTOR(S): MICHAEL ADAMS

PARKINSON-LIKE SYNDROME IN COCKROACHES STUNG BY A PARASITOID WASP

THE PARASITOID EMERALD JEWEL WASP (*AMPULEX COMPRESSA*) SUBJUGATES ITS HOST, THE AMERICAN COCKROACH (*PERIPLANETA AMERICANA*) THROUGH DIRECT ENVENOMATION OF ITS BRAIN. FOLLOWING VENOM INJECTION, THE STUNG ANIMAL FALLS INTO A SLEEP-LIKE STATE REFERRED TO AS HYPOKINESIA, WHEREUPON IT IS LED LIKE A DOG ON A LEASH BY THE WASP INTO ITS BURROW. AFTER DEPOSITING A SINGLE EGG ON THE METATHORACIC LEG OF THE HOST, THE WASP DEPARTS AND SEALS THE BURROW ENTRANCE. PAST COLLABORATIVE WORK OF ADAMS LAB AT UCR AND THE LIBERSAT LAB AT BEN GURION UNIVERSITY, ISRAEL HAS DEMONSTRATED THAT; 1. STUNG COCKROACHES EXHIBIT REDUCED DESCENDING NEURONAL ACTIVITY FROM THE BRAIN TO CIRCUITRY IN THE THORACIC GANGLIA, 2. STUNG ANIMALS ALLOWED TO RECOVER ARE IMMUNE TO SUBSEQUENT ENVENOMATION, 3. THE VENOM IS A COCKTAIL OF OVER 200 PROTEINS AND SMALL MOLECULES THAT PROGRAM THE POST-ENVENOMATION BEHAVIORAL SEQUENCE OF THE HOST. QUESTIONS WE ARE CONCERNED WITH IS: DOES HYPOKINESIA COINCIDE WITH A REDUCTION IN NEURONAL ACTIVITY IN THE CENTRAL COMPLEX (CX) OF THE BRAIN, AN AREA KNOWN TO BE A CONTROL CENTER FOR LOCOMOTORY BEHAVIOR. IN PARTICULAR, DOES HYPOKINESIA INVOLVE ALTERED EFFICACY OF DOPAMINE SIGNALING OF THE CX? IS BEHAVIORAL IMMUNITY CORRELATED WITH THE INSENSITIVITY OF CX SIGNALING TO ENVENOMATION? TO ADDRESS THESE QUESTIONS, WE WILL ATTEMPT TO PERFORM CALCIUM IMAGING ON SLICES OF THE COCKROACH BRAIN CONTAINING THE CX AND DETERMINE WHETHER VENOM EXPOSURE IN VITRO ALTERS SPONTANEOUS AND EVOKED NEURONAL ACTIVITY.

MELVIN HODANU, BIOCHEMISTRY

FACULTY MENTOR(S): DAWN NAGEL

UNDERSTANDING THE ROLE OF B-BOXES IN RESPONSE TO HEAT AND DROUGHT STRESS

AS A RESULT OF CLIMATE CHANGE AND INCREASING POPULATION GROWTH, FOOD PRODUCTION NEEDS TO BE SIGNIFICANTLY INCREASED. THE OVERALL GOAL OF THIS PROJECT IS TO MAKE CROPS MORE RESILIENT TOWARDS ABIOTIC STRESSES SUCH AS DROUGHT AND HEAT. THE CIRCADIAN CLOCK IS AN INTERNAL BIOLOGICAL SYSTEM THAT HELPS PLANTS COORDINATE IMPORTANT BIOLOGICAL PROCESSES LIKE TRANSCRIPTIONAL REGULATION IN PLANT SIGNALING THROUGH REGULATION OF GENE EXPRESSION. PREVIOUS RESEARCH IN THE PLANT MODEL *ARABIDOPSIS THALIANA* (*ARABIDOPSIS*) IDENTIFIED THAT A TRANSCRIPTION FACTOR FAMILY OF PROTEINS, B-Box's (BBX's) REGULATE HOW PLANTS RESPOND TO ABIOTIC STRESS, NAMELY AN INCREASE OR DECREASE IN TEMPERATURE. TO IDENTIFY THE RELATIONSHIP, WHETHER CAUSAL OR CORRELATIONAL, IS ONE OF THE GOALS OF OUR RESEARCH PROJECT. THUS, I AM USING BBX MUTANTS TO TEST SURVIVAL TO HEAT AND DROUGHT TREATMENTS TO HELP IDENTIFY GENES OF INTEREST THAT MAY PLAY A FUNCTIONAL ROLE IN STRESS TOLERANCE. IN THIS PROJECT, I HAVE BEEN UTILIZING AVAILABLE MUTANT KNOCKDOWN *ARABIDOPSIS* LINES, BUT FIRST I VERIFIED THESE MUTANTS WITH PCR GENOTYPING. ALSO IN THIS PROJECT, I CREATED OVEREXPRESSION LINES ALSO IN *ARABIDOPSIS*. WITH THIS KNOWLEDGE, THE LONG-TERM GOAL IS TO ENGINEER PLANTS TO BE MORE TOLERANT TO HEAT AND DROUGHT STRESS WHICH IN TURN SHOULD INCREASE CROP PRODUCTION.

VANESSA HUA, ENVIRONMENTAL SCIENCES

FACULTY MENTOR(S): ROYA BAHREINI

SEASONAL VARIATION OF PM₁₀ AND H₂S CONCENTRATIONS IN CITIES NEIGHBORING THE SALTON SEA

THE SALTON SEA IS A 345 SQ. MILE LAND-LOCKED LAKE SITUATED IN THE IMPERIAL VALLEY THAT IS SLOWLY RECEDING DUE TO CHANGING WEATHER PATTERNS, DROUGHTS, AND WATER DEMANDS. THE EXPOSURE OF ITS PLAYA DUE TO REDUCED WATER LEVELS HAS LED TO AN INCREASED DISPERSAL OF PARTICULATE MATTER IN SURROUNDING AREAS. AS SUCH, MOBILIZATION OF THE DRIED LAKEBED SEDIMENTS AND OTHER POLLUTANTS FROM THE WATER COLUMN OR SEDIMENTS BY WIND MAY HAVE A SIGNIFICANT IMPACT ON THE HEALTH OF NEARBY RESIDENTS BY THE SALTON SEA. IT IS THEREFORE IMPORTANT TO STUDY POLLUTANT CONCENTRATIONS IN NEIGHBORING CITIES IN ORDER TO CONSIDER EFFECTIVE MITIGATION MEASURES. IN THIS PROJECT, WE FOCUS ON TWO OF THESE POLLUTANTS: PM₁₀ (ATMOSPHERIC PARTICULATE MATTER WITH A DIAMETER LESS OR EQUAL TO 10 MM) AND H₂S (HYDROGEN SULFIDE). WE ANALYZE ROUTINE METEOROLOGICAL AND AIR QUALITY MEASUREMENTS COLLECTED OVER A PERIOD OF TWO YEARS — 2020 TO 2021 — IN THE CITIES OF MECCA AND INDIO. IN ORDER TO STUDY THE EFFECTS OF SEASONALITY ON PM₁₀ AND H₂S CONCENTRATIONS, WE MAKE USE OF DATA VISUALIZATION SOFTWARE TO STUDY THE CORRELATION BETWEEN THESE VARIABLES AND WIND DIRECTION ON A SEASONAL SCALE. WE FIND A STRONG CORRELATION BETWEEN POLLUTANT CONCENTRATIONS AND WIND DIRECTION, THE FORMER HAVING A BIGGER INFLUENCE THROUGHOUT SUMMER MONTHS WHEN THE EFFECTS OF EUTROPHICATION (ANOXIA) AND EVAPORATION ARE PREVALENT.

VIVIAN HUYNH, BIOLOGY

FACULTY MENTOR(S): JOHN FRANCHAK

THE INFLUENCE OF KNOWLEDGE ON FREE-VIEWING GAZE BEHAVIOR OF INFANTS AND ADULTS

MANY FACTORS PLAY A ROLE IN WHAT WE CHOOSE TO PAY ATTENTION TO, INCLUDING BOTTOM-UP FACTORS SUCH AS CONTRAST, LUMINANCE, AND MOVEMENT, AND TOP-DOWN FACTORS SUCH AS MEMORY, CONTEXT, AND GOALS. IN PRIOR RESEARCH, FACES WERE USED AS AN INDICATOR OF TOP-DOWN ATTENTION IN INFANTS, HOWEVER, IT IS PROBLEMATIC BECAUSE FACES ARE BOTH SOCIALLY RELEVANT (TOP-DOWN) AND HIGHLY SALIENT (BOTTOM-UP). IN THE PRESENT STUDY, WE WILL MANIPULATE PARTICIPANT KNOWLEDGE THROUGH A GAZE-CONTINGENT PARADIGM, AND THEN COMPARE THE GAZE BEHAVIORS OF 8, 12, AND 18-MONTH-OLD INFANTS WITH AN ADULT SAMPLE TO ASSESS THE CONTRIBUTIONS OF BOTTOM-UP AND TOP-DOWN FACTORS. PARTICIPANTS WILL FIRST BE PRESENTED WITH EIGHT GAZE-CONTINGENT TRIALS IN WHICH A FIXATION TO THE PREVIOUSLY DETERMINED CONTINGENT OBJECT WILL TRIGGER AN ENGAGING FIVE SECOND VIDEO CLIP. NEXT, PARTICIPANTS WILL BE PRESENTED WITH EIGHT FREE-VIEWING TRIALS IN WHICH THEY WILL WATCH 30 S VIDEO CLIPS TAKEN FROM “BABY EINSTEIN” THAT INCLUDE THE SAME OBJECTS THEY WERE EXPOSED TO IN THE GAZE-CONTINGENT TRIALS. WE CAN THEN COMPARE THE GAZE PATTERNS BY CALCULATING A SIMILARITY SCORE TO ASSESS WHETHER INFANTS ARE FOLLOWING THE NARRATIVE OF THE VIDEOS (HIGHER SIMILARITY SCORES). I PREDICT THAT THE OLDER INFANTS WILL BE MORE SIMILAR TO ADULTS BY FOLLOWING THE NARRATIVE OF THE VIDEO WHILE THE YOUNGER INFANTS WILL FOCUS THEIR ATTENTION ON THE SALIENT OBJECTS.

MAYA IBELAI DENE, BIOLOGY

FACULTY MENTOR(S): PRUE TALBOT

ELECTRONIC CIGARETTES: A LITERATURE REVIEW ON THE EFFECTS OF FLAVOR CHEMICALS ON EARLY EMBRYONIC DEVELOPMENT

PREGNANT WOMEN WHO CANNOT QUIT SMOKING TOBACCO CIGARETTES HAVE SOMETIMES SWITCHED TO ELECTRONIC CIGARETTES (ECs)

DUE TO PERCEPTIONS THAT ECs ARE "SAFER" THAN TOBACCO CIGARETTES. IN FACT, 7.0% OF WOMEN REPORT USING ECs AT SOME POINT IN THEIR PREGNANCY, WHILE 1.4% REPORT USING ECs DURING THE LAST 3 MONTHS OF PREGNANCY (KAPPAYA ET. AL, 2015). ECs AEROSOLS CONTAIN HIGH CONCENTRATIONS OF FLAVOR CHEMICALS, SUCH AS CINNAMALDEHYDE, VANILLIN, AND MENTHOL, WHICH HAVE THE POTENTIAL OF BINDING TO TRANSIENT RECEPTOR POTENTIAL (TRP) CHANNELS. SEVENTEEN TRP RECEPTORS WERE EXPRESSED AT VARIOUS STAGES OF EARLY HUMAN DEVELOPMENT INCLUDING: TRPA1, TRPV1, TRPV3, TRPV4, TRPV6, TRPM2, TRPM5, TRPM4, TRPM7, TRPM8, TRPC3, TRPC6, TRPC7, TRPML1, TRPML2, TRPP1, AND TRPP3. THE PURPOSE OF THIS REVIEW IS TO EVALUATE THE TRP CHANNELS AND THEIR ROLES IN THE EARLY STAGES OF HUMAN DEVELOPMENT, WHILE ALSO DELVING INTO THE SCIENTIFIC LITERATURE THAT ILLUSTRATES THAT FLAVORED CHEMICALS IN ECs ADVERSELY AFFECT HUMAN EMBRYOS. THIS REVIEW WILL PROVIDE INFORMATION FOR PREGNANT WOMEN ON THE POTENTIAL RISKS OF VAPING ECs UNTIL THE EFFECTS OF THEIR FLAVOR CHEMICALS ON HUMAN EMBRYOS ARE FULLY UNDERSTOOD AND PROVIDE INFORMATION THAT WILL POTENTIALLY DETER PEOPLE FROM USING ELECTRONIC CIGARETTES IN GENERAL.

IVAN JACUINDE, CELL, MOLECULAR, DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): LINLIN ZHAO

FORMATION OF INTERSTRAND CROSSLINKED DNA DERIVED FROM ACETALDEHYDE EXPOSURE AND THE GENETIC RESPONSIBILITY OF THE ALDH GENE: A LITERATURE REVIEW

DNA IS WIDELY KNOWN TO BE A REACTIVE POLYMER THAT CAN REACT WITH BOTH ENDOGENOUS AND EXOGENOUS SOURCES TO FORM WHAT IS KNOWN AS DNA LESIONS, OR ABNORMALITIES WITHIN THE DNA DOUBLE HELIX. SPECIFICALLY, ACETALDEHYDE IS ONE EXAMPLE OF EXOGENOUS SOURCES THAT CAN REACT WITH DNA AND CREATE LESIONS THAT POSE BIOLOGICAL CONSEQUENCES. ACETALDEHYDE IS INTRODUCED INTO THE BIOLOGICAL ENVIRONMENT VIA THE METABOLISM OF ETHANOL AND WHEN REACTED WITH DNA, THEY CAN CREATE STRUCTURALLY DEFINED LESIONS THAT ARE CALLED INTERSTRAND CROSS LINKED (ICL) DNA. ICL DNA FORMS WHEN TWO DNA BASES ARE COVALENTLY LINKED TO ONE ANOTHER AND MODIFYING THEIR CHEMICAL STRUCTURE FROM THE TRADITIONAL HYDROGEN BONDING THAT IS OBSERVED. ACETALDEHYDE CAN BE INTRODUCED VIA THE METABOLISM OF ETHANOL AND CERTAIN ENZYMES IN THIS METABOLIC PATHWAY, SUCH AS ALDH, ARE PIVOTAL FOR PROPER BREAKDOWN OF ACETALDEHYDE. ANY MUTATION OR GENETIC ALTERATION TO THIS ALDH ENZYME IMPROPERLY METABOLIZES ACETALDEHYDE AND INTRODUCES IT INTO THE BIOLOGICAL ENVIRONMENT WHERE IT IS ABLE TO REACT WITH DNA AND CREATE AN ICL LESION. IN THIS REVIEW, WE UNCOVER THE RECENT ADVANCES IN THE REPAIR MECHANISMS TO THESE ICL LESIONS IN WHICH ALSO DETAIL THE GENETIC FACTORS AND CONTROLS FOR THE ALDH GENE FAMILY THAT IS RESPONSIBLE FOR DETOXIFICATION OF THE ACETALDEHYDE CARCINOGEN

ROBBIE JIAO, APPLIED MATHEMATICS/GENERAL

FACULTY MENTOR(S): KURT ANDERSON

UNDERSTANDING PREDISPOSITION OF ADAPTIVE FORAGING ON SYSTEM'S DYNAMIC

INTRAGUILD PREDATION (IGP) IS A SPECIES INTERACTION WHEREIN AN INTRAGUILD IG PREDATOR COMPETES WITH ITS INTRAGUILD IG PREY FOR A SHARED BASAL RESOURCE. IGP THEORY ASSUMES THAT THE PREY NEEDS TO BE A SUPERIOR COMPETITOR IN ORDER FOR ALL SPECIES TO COEXIST LONG-TERM. THIS STUDY SOUGHT TO INVESTIGATE HOW ADAPTIVE FORAGING BEHAVIOR AND INCIDENCE OF CANNIBALISM IN AN IG PREDATOR AFFECTS IG PREY PERSISTENCE WHEN THE PREY IS EITHER A SUPERIOR COMPETITOR FOR THE RESOURCE OR SIMILAR IN COMPETITIVE ABILITY COMPARED TO THE PREDATOR. WE STUDIED HOW PREDATOR PREFERENCE FOR HETEROSPECIFICS AND CONSPECIFICS AFFECT THE SYSTEM DYNAMICS THROUGH A PREFERENCE PARAMETER, s . WE AIM TO COMPARE COMPETITIVE ABILITY FOR A RESOURCE BY MODELING EACH SPECIES AS A FUNCTION OF A SWITCHING PARAMETER, s , AND A CARRYING CAPACITY, K , TO OBSERVE PREDATOR'S PREY SWITCHING BEHAVIOR AND RESOURCE CARRYING CAPACITY AFFECTS ON THE SYSTEM DYNAMICS.

USING ODES, WE TESTED THE STABILITY OF A MODIFIED THREE SPECIES FOOD WEB MODEL AND OBSERVED THE TYPE ONE AND TYPE TWO

FUNCTIONAL RESPONSE. WHEN ALL PROTIST SPECIES HAVE EQUAL COMPETITIVE ABILITY, WE FOUND THAT S NEEDS TO BE AT A HIGHER PREFERENCE FOR ITS CANNIBALISTIC STATE, SUCH THAT THE PREDATOR CONSUMES INDIVIDUALS OF ITS OWN POPULATION—THUS REGULATING ITS POPULATION AND PREVENTING OVEREXPLOITATION OF PREY. OVERALL, OUR RESULTS SUGGEST THAT COEXISTENCE BETWEEN PREDATOR AND PREY IN AN IGP SYSTEM IS OBTAINABLE WHEN THE PREY AND PREDATOR ARE SIMILAR COMPETITORS FOR THE RESOURCE PROVIDED THE PREDATOR HAS A PREFERENCE FOR CONSUMING CONSPECIFICS.

SASHA KAPADIA, BIOLOGY

FACULTY MENTOR(S): JACK EICHLER

STUDENT STRESS LEVELS IN ONLINE INSTRUCTION VERSUS IN-PERSON INSTRUCTION

THE LIVES OF STUDENTS IN HIGHER EDUCATION WERE DRAMATICALLY IMPACTED OVER THE PAST TWO YEARS DUE TO THE CORONAVIRUS PANDEMIC AND THE IMPACT IT HAS HAD ON THE WORLD. THE SHIFT TO ONLINE LEARNING FOR STUDENTS ACROSS THE WORLD HAS PROVEN TO BE DIFFICULT, AND HARD TO ADJUST FOR MANY. THE SUDDEN TRANSITION TO ONLINE CLASSES CAN IMPACT A STUDENT'S LEARNING EXPERIENCE AND STRESS LEVELS. IN-PERSON VERSUS ONLINE CLASSES HAVE OBVIOUS DIFFERENCES, BUT THE IMPACT ON THE STUDENTS HAS BEEN EXAMINED FURTHER IN THIS STUDY. THIS HAS BEEN EXPLORED THROUGH INDIVIDUAL INTERVIEWS WITH EACH STUDENT, AND THE INTERVIEWS WERE CONDUCTED IN A SEMI-STRUCTURED APPROACH. BEFORE THE INTERVIEW, THE STUDENTS WERE ASKED TO COMPLETE A GOOGLE FORM WITH QUESTIONS REGARDING THEIR DEMOGRAPHIC BACKGROUND, IN WHICH THEIR CURRENT CLASS LOAD, CUMULATIVE GPA, WHETHER THEY RECEIVE FINANCIAL AID, AND GENERATIONAL STATUS WERE ANALYZED AND ASSESSED. THE INTERVIEW QUESTIONS WERE STRUCTURED IN SUCH A WAY THAT THE BEGINNING QUESTIONS WERE MORE OPEN-ENDED AND UNBIASED, AND AS THE INTERVIEW PROGRESSED, THE QUESTIONS BECAME MORE POINTED AND OPINIONATED. THE PARTICIPANTS CONSISTED OF 30 STUDENTS: 15 STUDENTS FROM CHASS AND 15 STUDENTS FROM CNAS. DUE TO THE UNFORESEEN SHIFT TO REMOTE LEARNING, IT IS REASONABLE TO SAY THAT ONLINE INSTRUCTION HAS INCREASED THE STRESS LEVELS OF STUDENTS, WHICH IMPACTS THEIR OVERALL PERFORMANCE. THESE RESULTS WILL BE USEFUL IN THE FUTURE TO GAUGE STUDENTS' PERCEPTIONS OF ONLINE INSTRUCTION AS WELL AS UNDERSTAND MORE ABOUT HOW THEIR STRESS CAN CHANGE WITH A DIFFERENT LEARNING ENVIRONMENT.

MOWKTHIKA KAVURI, NEUROSCIENCE

FACULTY MENTOR(S): NICOLE ZUR NIEDEN

THE UTILIZATION OF EMBRYONIC STEM CELLS TO DISCERN EMBRYOTOXICITY IN VITRO

THE TERMS DEVELOPMENTAL TOXICITY AND EMBRYOTOXICITY ARE BECOMING PROMINENT IN TODAY'S RESEARCH, DRAWING ATTENTION TO THE HARMFUL TOXICANTS PREGNANT WOMEN ARE EXPOSED TO ON A DAY-TO-DAY BASIS. CHEMICALS IN INDUSTRY AND IN THE ENVIRONMENT, AS WELL AS CONSUMER PRODUCTS CAN CRITICALLY HINDER TISSUE MATURATION AND METABOLISM OF THE FETUS. CURRENTLY, ADVERSE EFFECTS OF CHEMICAL EXPOSURE ARE TESTED USING IN VIVO MODELS. HOWEVER, TO SPARE ANIMALS, IN VITRO METHODS HAVE BEEN DEVELOPED, AMONG THEM THE EMBRYONIC STEM CELL TEST (EST) THAT USES EMBRYONIC STEM CELLS (ESCs). ESCS ARE EXTRACTED FROM THE INNER CELL MASS OF A BLASTOCYST AND CAN MODEL VARIOUS STAGES OF EMBRYOGENESIS, WHILE REPLICATING THE CONDITIONS AND CELL-CELL SIGNALS EMINENT IN EARLY DEVELOPMENT. THE EST USES THREE TOXICOLOGICAL ENDPOINTS TO COMPARE THE EXTENT OF A CHEMICAL'S INFLUENCE ON DEVELOPMENT: CYTOTOXICITY IN ESCS, DIFFERENTIATION INHIBITION IN ESCS, WHICH BOTH ACT AS A SURROGATE FOR EMBRYO DEVELOPMENT, AND CYTOTOXICITY ON FIBROBLASTS, WHICH REPRESENT MATERNAL EFFECTS. CONCENTRATION-RESPONSE CURVES AND LINEAR DISCRIMINANT ANALYSIS ARE THEN ABLE TO IDENTIFY A CHEMICAL'S POTENCY TO CAUSE DEVELOPMENTAL PROBLEMS, RANGING FROM INSIGNIFICANT EFFECTS TO POSING THREATS TO VITAL FUNCTIONS DURING THE FETAL STAGE. ORIGINALLY INVENTED WITH MOUSE CELLS, THE PREDICTIVITY OF THIS MODEL FOR HUMAN RISK ASSESSMENT IS QUESTIONABLE. THEREFORE, THIS PROJECT WILL PRESENT DATA ON THE POTENTIAL DIFFERENTIAL PREDICTIVITY OF HUMAN CELLS BY TESTING A SMALL BATTERY OF

CHEMICALS IN BOTH MODEL SYSTEMS.

BILL KAVVATHAS, NEUROSCIENCE

FACULTY MENTOR(S): EMMA WILSON

MAINTAINING THE BALANCE BETWEEN TOXOPLASMA GONDII AND THE IMMUNE SYSTEM DURING CHRONIC INFECTION

FOLLOWING INFECTION OF BRAIN NEURONS WITH THE PARASITE TOXOPLASMA GONDII, THE IMMUNE SYSTEM RESPONDS AND MAINTAINS PRESSURE FOR THE DURATION OF THE HOST'S LIFE. IN ORDER TO CONTROL INFECTION, THE IMMUNE SYSTEM EMPLOYS BOTH INNATE AND ADAPTIVE RESPONSES TO MAINTAIN BRAIN HOMEOSTASIS WHICH INCLUDES THE INVOLVEMENT OF INNATE NEUTROPHILS AND ADAPTIVE T-CELLS. WHILE IMMUNOCOMPETENT HOSTS HAVE NO CLINICAL PATHOLOGY DUE TO A BALANCED IMMUNE RESPONSE, IMMUNOCOMPROMISED HOSTS DEVELOP SEIZURES AND ENCEPHALOPATHY DUE TO NEUROPATHOLOGY. HOWEVER, A SMALL SUBSET OF BRAIN RESIDENT NEUTROPHILS ARE BELIEVED TO BE RESPONSIBLE FOR NEUROPROTECTION AND NEUROREGENERATION DURING CHRONIC INFECTION. WE WANTED TO TEST IF DEPLETING NEUTROPHILS IN THE BRAIN DECREASED NEUROPROTECTION AND NEUROREGENERATION USING IMMUNOFLUORESCENCE TECHNIQUES. OUR RESULTS HAVE SHOWN THAT DEPLETING NEUTROPHILS LEADS TO A DOWNREGULATION OF SLPI+ CELLS, WHICH IS INVOLVED WITH REGENERATION OF NEURONAL AXONS.

FORMATION OF CYSTS INSIDE NEURONS OF THE BRAIN ALTERS MANY PATHWAYS INCLUDING GLUTAMATE DYSREGULATION. THIS CAUSES AN INCREASE IN EXTRACELLULAR GLUTAMATE WHICH LEADS TO EXCITOTOXICITY VIA DOWNREGULATION OF GLUTAMATE TRANSPORTER 1 (GLT-1). FLOW CYTOMETRY DATA SUGGESTS THAT AT 3 WEEKS POST INFECTION, A LARGE POPULATION OF T-CELLS EXPRESS MGLUR RECEPTORS WHICH CAN RESPOND TO GLUTAMATE. BY USING IMMUNOFLUORESCENCE TECHNIQUES, WE WILL TEST IF THESE T-CELLS ARE RECRUITED TO SPECIFIC AREAS OF THE BRAIN TO RESPOND TO EXTRACELLULAR GLUTAMATE AND SITES OF CYSTS. WE HYPOTHEZIZE THAT THESE MGLUR+ T-CELLS ENTER THE BRAIN THROUGH THE BLOOD BRAIN BARRIER AND LOCALIZE TO AREAS WHERE GLT-1 IS DOWNREGULATED. THESE EXPERIMENTS DEMONSTRATE PREVIOUSLY UNKNOWN BRAIN-SPECIFIC FUNCTIONS OF IMMUNE CELLS DURING CHRONIC INFECTION.

KALI KRISHNAN, APPLIED MATHEMATICS

FACULTY MENTOR(S): DANIEL SCHLENK

INVESTIGATING THE OCCURRENCE AND IMPACTS OF ESTROGENICALLY ACTIVE COMPOUNDS IN THE SANTA ANA RIVER

WASTEWATER TREATMENT PLANTS (WWTP) HAVE BEEN SHOWN TO DISCHARGE COMPOUNDS KNOWN AS ESTROGENICALLY ACTIVE COMPOUNDS (EACs) AT RELATIVELY LOW CONCENTRATIONS. PREVIOUS STUDIES LARGE MOUTH BASS (LMB) (MICROPTERUS SALMOIDES) IN THE SANTA ANA RIVER (SAR) HAVE INDICATED INTERSEX WITHIN INDIVIDUALS AS A FUNCTION OF DISTANCE FROM WASTEWATER OUTFLOWS; HOWEVER, THE LINK BETWEEN DISCHARGED EACs AND THE INCREASE IN INTERSEX INDIVIDUALS OF LMB REMAINS TO BE STUDIED.

TO CONFIRM THE RELATIONSHIP BETWEEN EACs AND INTERSEX, SAMPLES OF LMB WERE COLLECTED THROUGHOUT THE SAR AND GONAD HISTOLOGY WAS EVALUATED WITH RESPECT TO DISTANCE FROM WWTP TO CONFIRM THE TREND SEEN IN PREVIOUS STUDIES.

THE PRESENCE OF 3 COMMON ESTROGENS WAS MEASURED IN SAR WATER SAMPLES. IN ADDITION, ESTROGEN ACTIVITY WAS ALSO MEASURED IN WATER, SEDIMENT, PERIPHYTON, AND MACROINVERTEBRATES WILL BE MEASURED USING A CELL BIOASSAY THAT DETERMINES ESTROGEN RECEPTOR LIGANDS WITHIN EXTRACTS. THESE STUDIES WILL BE CONDUCTED TO ACCOUNT FOR POTENTIAL BIOMAGNIFICATION IN THE FOOD WEB.

LASTLY, TRANSCRIPTIONAL EXPRESSION OF THE EGG-YOLK PROTETIN, VITELLOGENIN, WILL BE MEASURED IN MALE ANIMALS TO DETERMINE IF INTERSEX AND ESTROGENIC ACTIVITY WITHIN THE ANIMALS ARE RELATED.

EAC'S INFLUENCE ON INTERSEX IN LMB WILL HAVE IMPLICATIONS AFFECTING MANAGEMENT DECISIONS OF OTHER FISH IN THE SAR SUCH AS THE FEDERALLY THREATENED NATIVE SANTA ANA SUCKER. WATER USE FOR HUMAN CONSUMPTION FROM THE SAR OPENS OPPORTUNITY FOR FURTHER RESEARCH REGARDING EACs AND THE EXTENT OF NEGATIVE IMPACTS ON HUMAN HEALTH.

VIVIAN LE, NEUROSCIENCE

FACULTY MENTOR(S): ELIZABETH BERGER

TRAUMA CARE AND TRAUMA CENTERS: AN ANALYSIS OF MEDICAL, SOCIAL, AND ECONOMIC EFFECTIVENESS

THIS RESEARCH EXPLORES THE CONCEPTION OF TRAUMA CARE, BIOMEDICAL ADVANTAGES OR DISADVANTAGES OF THE EXISTENCE OF TRAUMA CENTERS, AND POTENTIAL SOCIAL HEALTH INEQUALITIES THAT THEY REINFORCE. PREVIOUS LITERATURE SUGGESTS THAT TRAUMATIC INJURIES ARE TIME-SENSITIVE AND HAVE HIGHER SURVIVAL RATES WHEN TREATED AT CERTAIN MEDICAL FACILITIES. UTILIZING DIGITAL MAPPING SOFTWARE, WE WERE ABLE TO VISUALIZE WHICH DEMOGRAPHICS OF AMERICANS ARE UNDERSERVED. THE DATA DISPLAYED THAT AMERICANS WHO ARE OF LOWER INCOME ARE UNINSURED OR BELONG TO A RACIAL BACKGROUND THAT IS NOT WHITE OR ASIAN ARE MORE LIKELY TO LIVE FURTHER AWAY FROM TRAUMA CENTERS, FALLING OUTSIDE OF THE PREFERRED TIME FRAME TO REACH A TRAUMA FACILITY. THIS AFFECTS THEIR ACCESS TO WELL-EQUIPPED MEDICAL CARE, LESS SPECIALIZED MEDICAL PROFESSIONALS, AND ULTIMATELY, QUALITY OF CARE. WHILE THERE ARE CONFLICTING ARGUMENTS ON THE TOPIC AS TRAUMA CARE IS A RELATIVELY NEW AND ONGOING AREA OF RESEARCH, BASED ON THESE RESULTS, POPULATIONS THAT ALREADY FACE OTHER SOCIOECONOMIC SETBACKS MAY HAVE THIS ADDITIONAL DISADVANTAGE IN HEALTHCARE.

MIGUEL LUJAN, BIOCHEMISTRY

FACULTY MENTOR(S): KERRY MAUCK

PLANT IMMUNITY ELICITORS ON LETTUCE METABOLITE COMPOSITION AND RESISTANCE TO IMPATIENS NECROTIC SPOT VIRUS

IN THE SALINAS VALLEY IN CALIFORNIA, THERE IS A MAJOR OUTBREAK OF THE INSECT-TRANSMITTED PLANT VIRUS KNOWN AS IMPATIENS NECROTIC SPOT VIRUS (INSV). THIS VIRUS IS TRANSMITTED THROUGH THE FEEDING OF INSECTS CALLED THRIPS. VIRUS MANAGEMENT IS ACHIEVED THROUGH FREQUENT USE OF INSECTICIDES, BUT NOT EFFECTIVE BECAUSE THE INSECTS CAN DEVELOP RESISTANCE AND INSV TRANSMISSION CAN OCCUR BEFORE INSECT DEATH. ONE ALTERNATIVE MANAGEMENT APPROACH IS USING ELICITORS TO PRIME THE PLANT IMMUNE SYSTEM TO BETTER PREPARE THE PLANT TO RESIST INFECTION. HOWEVER, SINCE ELICITORS ARE MOSTLY USED AGAINST FUNGAL AND BACTERIAL PATHOGENS, IT IS UNKNOWN IF COMMERCIAL PRIMING AGENTS ARE EFFECTIVE AGAINST INSV. TO STUDY THIS ISSUE, SEVERAL ELICITORS WERE TESTED TO DETERMINE EFFECTS ON PLANT GROWTH AND QUALITY AND RESISTANCE TO INSV. ELICITORS ACTIGARD, CABRIO EG, DESECT, AND REGALIA, ALONG WITH WATER FOR CONTROL, WERE APPLIED TO ROMAINE LETTUCE TO EVALUATE EFFECTS OF PLANT GROWTH AND METABOLITE COMPOSITION, SUCH AS SUGAR AND AMINO ACID LEVELS IN LEAVES. IN A SECOND EXPERIMENT, ELICITOR TREATED PLANTS WERE TESTED FOR INDUCED RESISTANCE TO INSV, AS MEASURED BY INFECTION SUCCESS AND VIRUS TITER. RESULTS SHOW NO SIGNIFICANT CHANGES IN PLANT GROWTH DUE TO ELICITOR APPLICATION. INSV CHALLENGE EXPERIMENTS SUGGEST THE ELICITORS ACTIGARD, CABRIO EG, AND REGALIA MAY BE USEFUL FOR REDUCING INSV INFECTION SUCCESS (FEWER PLANTS INFECTED). HOWEVER, TREATED PLANTS THAT DID BECOME INFECTED DO NOT HAVE REDUCED TITER. THESE RESULTS SUGGEST THAT ELICITORS ARE SAFE TO USE FOR INSV MANAGEMENT BUT THAT THEY LIKELY STILL MUST BE USED IN COMBINATION WITH INSECTICIDES.

LISA MARTINEZ, NEUROSCIENCE

FACULTY MENTOR(S): TODD FIACCO

COMPARISON OF HYPEROSMOLAR VOLUME REDUCTION BETWEEN ASTROCYTES AND NEURONS IN THE LIVING BRAIN SLICE

EPILEPSY IS THE FOURTH MOST COMMON NEUROLOGICAL DISORDER THAT AFFECTS MORE THAN 200,000 OF THE POPULATION. APPROXIMATELY 33% OF PATIENTS ARE UNRESPONSIVE TO CURRENT ANTIEPILEPTIC DRUGS. THEREFORE, IT IS IMPERATIVE TO UNDERSTAND THE MECHANISMS UNDERLYING EPILEPSY THAT WILL ENABLE THE PROGRESS OF NEW TREATMENTS. ON A CELLULAR LEVEL, SEIZURES ARE PRECEDED BY RAPID INCREASES IN CELLULAR VOLUME CAUSING TISSUE SWELLING. THESE CHANGES REDUCE THE BRAIN'S EXTRACELLULAR SPACE AND INCREASE NEURONAL EXCITABILITY. THE OVERALL GOAL OF MY WORK IS TO TEST A TECHNIQUE FOR CELLULAR SHRINKING TO DETERMINE IF THERE ARE DIFFERENTIAL EFFECTS BETWEEN ASTROCYTES AND NEURONS. TO THIS END, I WILL APPLY A HYPEROSMOLAR ARTIFICIAL CEREBROSPINAL FLUID (ACSF) TO BRAIN TISSUE SLICES AND RECORD EFFECTS ON NEURONAL AND ASTROCYTE VOLUME IN REAL TIME USING CONFOCAL MICROSCOPY OF FLUORESCENTLY-LABELED CELLS. A RED DYE CALLED SULFORHODAMINE 101 (SR-101) WILL BE USED TO LABEL ASTROCYTES SELECTIVELY IN BRAIN TISSUE. NEURONS WILL BE FLUORESCENTLY LABELED WITH ENHANCED GREEN FLUORESCENT PROTEIN (EGFP) USING TRANSGENIC MICE, IN WHICH EGFP IS EXPRESSED DOWNSTREAM OF THE NEURON-SPECIFIC PROMOTER THY-1 (THY1-EGFP MICE). I HYPOTHEZIZE THAT APPLICATION OF HYPEROSMOLAR ACSF WILL CAUSE SIGNIFICANTLY GREATER SHRINKING OF ASTROCYTES COMPARED TO NEURONS, AS NEURONS HAVE BEEN HYPOTHEZIZED TO HAVE A MORE RIGID CYTOSKELETON COMPARED TO ASTROCYTES. FINDINGS FROM THIS WORK COULD LEAD TO A USEFUL APPROACH TO FORCE VOLUME REDUCTION OF ASTROCYTES TO DETERMINE THEIR SELECTIVE CONTRIBUTION TO BRAIN TISSUE EXCITABILITY IN MODELS OF CELLULAR EDEMA, STROKE, AND EPILEPSY.

STEPHANIE MARTINEZ-BELTRAN, MICROBIOLOGY

FACULTY MENTOR(S): ADLER DILLMAN, NAOKI YAMANAKA

IMMUNE RESPONSE STUDY OF DROSOPHILA MELANOGASTER CRISPR MUTANTS

DROSOPHILA MELANOGASTER, THE COMMON FRUIT FLY, IS ONE OF THE MOST PREDOMINANTLY USED MODEL ORGANISMS IN GENETIC STUDIES DUE TO ITS SIGNIFICANT HOMOLOGY TO HUMANS. GENOMIC DNA BLAST DATA SUPPORT THIS CONCLUSION, YET INSUFFICIENT EXPERIMENTAL EVIDENCE IS AVAILABLE TO CONFIRM THE SIMILARITIES BETWEEN THEIR IMMUNE SIGNALING PATHWAYS. STUDYING D. MELANOGASTER'S BACTERIAL-INDUCED INNATE IMMUNE RESPONSES HELPS GENETICISTS UNDERSTAND CONSERVED GENES AND BIOCHEMICAL PATHWAYS ESSENTIAL TO ARTHROPOD AND HUMAN IMMUNE RESPONSES. THEREFORE, UNDERSTANDING LIPID SIGNALING CASCADES AND THE EFFECTS OF ABSENT UPSTREAM ENZYMES IS CRUCIAL. OUR STUDY EXAMINED THE POTENTIAL IMMUNE FUNCTIONS OF VARIOUS ENZYMATIC HOMOLOGS OF THE LIPID AND EICOSANOID SYNTHESIS PATHWAYS NECESSARY IN MAMMALIAN IMMUNE RESPONSES TO ELUCIDATE LIPID IMMUNE SIGNALS IN D. MELANOGASTER. WE IDENTIFIED A POTENTIAL ENZYME ESSENTIAL TO RESISTING STREPTOCOCCUS PNEUMONIAE BACTERIAL INFECTIONS BY UTILIZING CRISPR MUTANT FLIES WITH KNOCKOUTS. WE HYPOTHEZIZED THAT ENZYME KNOCKOUTS THAT PRODUCE ESSENTIAL PRO-IMMUNE LIPIDS WOULD SIGNIFICANTLY DECREASE FLY SURVIVAL RATE WHILE POTENTIALLY INCREASING MICROBE LOAD AND SUPPRESSING FURTHER DOWNSTREAM IMMUNE RESPONSES. OUR PRELIMINARY DATA SUGGEST THAT MUTANTS WITH THE GSTS1 GENE KNOCKOUT HAD SIGNIFICANTLY LOWER SURVIVAL RATES THAN THE CONTROL MUTANTS POST-INJECTION OF A 500 TO 1K-CELL DOSE OF S. PNEUMONIAE. THESE MUTANTS ALSO EXHIBITED AN INCREASE IN MICROBE LOAD, AS INDICATED IN THE 24-HOUR CFUS. THESE RESULTS SUGGEST THAT GENES INVOLVED IN DETOXIFYING METABOLITES THAT BACTERIA PRODUCE DURING INFECTION ARE KEY IN DROSOPHILA'S INNATE IMMUNITY AND SURVIVAL. FUTURE OBJECTIVES INCLUDE INVESTIGATING ADDITIONAL DOWNSTREAM (DOUBLE AND TRIPLE) ENZYMATIC KNOCKOUTS AND MEASURING ANTIMICROBIAL PEPTIDE PRODUCTION AND PHENOLOXIDASE ACTIVITY.

RUTH MELETZ, CHEMISTRY

FACULTY MENTOR(S): YING-HSUAN LIN

TEMPERATURE DEPENDENCE OF EMISSION PRODUCT DISTRIBUTION FROM VAPING OF VITAMIN E ACETATE

TEMPERATURE DEPENDENCE OF EMISSION PRODUCT DISTRIBUTION FROM VAPING OF VITAMIN E ACETATE

THE NATIONAL OUTBREAK OF VAPING-ASSOCIATED LUNG INJURIES (EVALI) IN 2019 WAS INDICATIVE OF THE DANGERS PRESENTED BY VAPING. SINCE THEN, THERE HAS BEEN EVIDENCE TO SUGGEST THAT VITAMIN E ACETATE (VEA) FOUND IN TETRAHYDROCANNABINOL (THC)-CONTAINING CARTRIDGES MAY BE THE CAUSE OF THESE CASES. RECENT VAPING STUDIES HAVE FOUND THAT VEA CAN DEGRADE INTO EMISSION PRODUCTS SUCH AS DUROQUINONE, KETENE, OR 1-PRISTENE – ALL MORE TOXIC THAN THE PARENT LIQUID. HOWEVER, THE ROLE OF COIL TEMPERATURE AND THE DEVICE ITSELF ON THE THERMAL DECOMPOSITION OF VEA AND ITS PRODUCT DISTRIBUTION HAS NOT BEEN FULLY ESTABLISHED. IN THIS STUDY, WE INVESTIGATED THE FORMATION OF VEA DECOMPOSITION PRODUCTS. VEA VAPING EMISSIONS WERE GENERATED AT TEMPERATURES RANGING BETWEEN 176-356 °C AND ANALYZED USING GAS-CHROMATOGRAPHY/MASS-SPECTROMETRY WITH ELECTRON IONIZATION (GC-EIMS). PURE PYROLYSIS OF VEA WAS ALSO INVESTIGATED BY GENERATING DEGRADATION PRODUCTS AT VARYING TEMPERATURES USING A TUBE FURNACE. WE OBSERVED THAT AS TEMPERATURE INCREASES, THE PRODUCTION OF CERTAIN COMPOUNDS SUCH AS DUROQUINONE INCREASES EXPONENTIALLY, WHILE OTHERS APPEAR TO BREAK DOWN FURTHER INTO LOWER MOLECULAR WEIGHT PRODUCTS. FURTHERMORE, THE PRODUCT DISTRIBUTION OF VAPE-PRODUCED AND PURE PYROLYSIS-INDUCED VEA EMISSIONS SHOW CLEAR DIFFERENCES. WHEREAS WE OBSERVE SIGNIFICANT DEGRADATION OF VAPED VEA AT 176 °C, PURE PYROLYSIS DOES NOT RESULT IN BREAKDOWN OF THE OIL UNTIL 322 °C, SUGGESTING THAT THE COIL SURFACE MAY ACT TO CATALYZE VEA DEGRADATION DURING VAPING. THE RESULTS FROM THIS STUDY HIGHLIGHT THE RISK OF VAPING BY EXPOSING THE POTENTIAL TOXICITY OF VAPING EMISSIONS AND THE SHIFT IN PRODUCT DISTRIBUTION AT COMMON USER TEMPERATURES.

LINA MORALES, NEUROSCIENCE

FACULTY MENTOR(S): DJURDJICA COSS

EMBRYONIC DEVELOPMENT OF GNRH NEURONS IN A MOUSE MODEL OF FRAGILE X SYNDROME

FRAGILE X SYNDROME (FXS) IS CAUSED BY MUTATIONS IN THE FRAGILE X MENTAL RETARDATION GENE (FMR1), LEADING TO A VARIETY OF DEVELOPMENTAL DISORDERS. IT AFFECTS 1/7000 MALES AND 1/11,000 FEMALES AND IS THE MOST COMMON MONOGENIC CAUSE OF AUTISM AND INTELLECTUAL DISABILITIES. INDIVIDUALS WITH FXS ALSO EXPERIENCE REPRODUCTIVE DISORDERS, SUCH AS PREMATURE OVARIAN FAILURE IN FEMALES AND MACROORCHIDISM IN MALES. REPRODUCTION IS CONTROLLED BY GNRH NEURONS IN THE HYPOTHALAMUS OF THE BRAIN. FMR1 IS HIGHLY EXPRESSED IN THE BRAIN, HOWEVER, THE ROLE OF FMR1 MUTATION IN THE HYPOTHALAMUS HAS NOT BEEN ADDRESSED. WE USED A MOUSE MODEL THAT LACKS THE FMR1 GENE (FMR1-KO) AND DETERMINED THAT FEMALE MICE STOP REPRODUCTION EARLY SIMILARLY TO WOMEN WITH MUTATIONS. FMR1-KO ALSO HAVE INCREASED CORPORA LUTEA NUMBER, LARGER LITTER SIZES, INCREASED FOLLICLE-STIMULATING HORMONE AND LUTEINIZING HORMONE LEVELS, AND HIGHER GNRH NEURON ACTIVITY. SINCE WE OBSERVED HIGHER GNRH ACTIVITY AND FXS IS A DEVELOPMENTAL DISORDER, WE WILL INVESTIGATE GNRH NEURON DEVELOPMENT. IN THIS STUDY, I WILL ANALYZE THE DEVELOPMENT OF GNRH NEURONS IN WILDTYPE AND FMR1-KO MICE AT THE EMBRYONIC DAY 15.5, WHICH IS A CRITICAL STAGE OF GNRH NEURON MIGRATION TO THEIR CORRECT LOCATION IN THE HYPOTHALAMUS. I WILL THEN QUANTIFY THE DIFFERENCES IN GNRH NEURON NUMBER AND MIGRATION PATTERNS TO DETERMINE IF FMR1 MUTATION CAUSES DIFFERENCES IN NEURONAL DEVELOPMENT. OVERALL, THIS STUDY WILL GIVE US INSIGHT INTO THE MECHANISMS UNDERLYING REPRODUCTIVE DISORDERS LINKED TO FMR1 MUTATIONS.

GABRIELLA MOUSSA, CELL, MOLECULAR, AND DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): NAOKI YAMANAKA

ANALYSIS OF MFS TRANSPORTERS AND RELATED LIPOPHILIC HORMONES IN ARTHROPOD SPECIES

WITH THE DEVELOPMENT OF MODERN GENETIC TOOLS AND RESEARCH METHODS HAS COME A BETTER UNDERSTANDING OF HOW ORGANISMS REGULATE THEIR BODIES. ONE ASPECT OF THIS REGULATION INCLUDES HORMONES, WHICH MAY BE CHARACTERIZED IN MANY WAYS. THIS INCLUDES LIPOPHILIC HORMONES, A GROUP OF HORMONES THAT MAY BE NOTABLY CATEGORIZED AS RELATIVELY SMALLER HORMONES PRESENT IN THE DEVELOPMENT AND MORPHOLOGICAL CHANGES OF MOST ORGANISMS. IN ARTHROPODS, THERE ARE NOT VERY MANY STUDIED LIPOPHILIC HORMONES AS THESE HORMONES CANNOT BE DIRECTLY STUDIED THROUGH COMMONLY USED GENETIC ANALYSIS. THIS LEAVES THE POSSIBILITY OF THERE BEING VITAL LIPOPHILIC HORMONES THAT HAVE SIMPLY NOT BEEN DISCOVERED OR STUDIED YET. WITH THE ISSUE OF LIPOPHILIC HORMONES BEING MODIFIED BY ENZYMES POST-TRANSCRIPTION RATHER THAN CODED DIRECTLY BY GENES, ANOTHER CHARACTERISTIC OF HORMONE REGULATION MUST BE ANALYZED: TRANSPORTERS. MAJOR FACILITATOR SUPERFAMILY (MFS) TRANSPORTERS ARE YET ANOTHER ASPECT OF HORMONE REGULATION THAT IS UNDERSTUDIED, BUT CAN PERMIT A BETTER ANALYSIS OF WHICH LIPOPHILIC HORMONES ARE PRESENT THROUGHOUT DEVELOPMENT. THROUGH PHYLOGENETIC ANALYSES OF THE GENES ENCODING MFS TRANSPORTERS IN INSECTS AND OTHER MODEL ARTHROPOD SPECIES, WE AIMED TO IDENTIFY HORMONE TRANSPORTERS THAT ARE NOT YET FUNCTIONALLY CHARACTERIZED. BY LOOKING FOR ORTHOLOGS OF ECDYSONE IMPORTERS RECENTLY IDENTIFIED IN FRUIT FLIES AND MOSQUITOES, WE IDENTIFIED CANDIDATE ECDYSONE IMPORTERS IN THE WESTERN TARNISHED PLANT BUG *LYGUS HESPERUS*. A HETEROLOGOUS CELL CULTURE SYSTEM IS CURRENTLY BEING USED TO FUNCTIONALLY CHARACTERIZE THESE TRANSPORTERS.

COURTNEY MURPHY, BIOCHEMISTRY

FACULTY MENTOR(S): JACK EICHLER

VOLUNTEER STUDY TESTING THE EFFICACY OF ONLINE SIMULATIONS

OVER THE COURSE OF THE LAST SEVERAL YEARS, THE IMPLEMENTATION OF SIMULATIONS IN STEM CLASSROOMS HAS BEEN ON THE RISE. THE UNIVERSITY OF COLORADO BOULDER HAS DEVELOPED PHET SIMULATIONS FOR MANY STEM DISCIPLINES, INCLUDING A PLETHORA FOR GENERAL CHEMISTRY TOPICS. TO TEST THE EFFICACY OF THESE SIMULATIONS FOR THE CHEMISTRY TOPICS OF GAS LAWS AND ENERGY OF REACTIONS, VOLUNTEERS WERE RECRUITED AND RANDOMLY PLACED INTO ONE OF TWO CONDITIONS. THE FIRST CONDITION MODELED A TRADITIONAL LECTURE ENVIRONMENT WITH ACTIVE LEARNING ELEMENTS, USING POLL EVERYWHERE QUESTIONS TO FACILITATE THINK-PAIR-SHARE COLLABORATIVE LEARNING. THE SECOND CONDITION INCLUDED AN ACTIVITY THAT GUIDED STUDENTS TO INDEPENDENTLY ACHIEVE THE LEARNING GOALS USING THE PHET SIMULATIONS. THE TRADITIONAL LECTURE ACTIVITIES AND THE ONLINE SIMULATION ACTIVITIES WERE DESIGNED WITH THE SAME LEARNING GOALS IN MIND. LEARNING GAINS WERE EVALUATED BY USING A TWO-GROUP PRE/POST-TEST DESIGN. TWO SAMPLE T-TESTS WERE USED TO DETERMINE IF THERE WAS A SIGNIFICANT DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST SCORES IN EACH TREATMENT GROUP FOR THE COMBINED TESTS AS WELL AS FOR EACH TOPIC INDIVIDUALLY. ANCOVA TESTS WERE THEN RUN USING PRE-TEST SCORES AS A COVARIATE TO DETERMINE IF THERE WAS A SIGNIFICANT DIFFERENCE IN POST-TEST PERFORMANCE BETWEEN THE TWO STUDY GROUPS. THESE ANALYSES SUGGEST THE USE OF PHET SIMULATIONS IN AN INDEPENDENT ONLINE LEARNING ENVIRONMENT DO NOT RESULT IN ANY NEGATIVE PERFORMANCE OUTCOMES RELATIVE TO THE ACTIVE CONTROL GROUP. IN SHORT, THIS INDICATES THAT PHET SIMULATION-BASED ACTIVITIES CAN BE USED IN AN INDEPENDENT LEARNING ENVIRONMENT TO FOSTER STUDENT LEARNING GAINS IN INTRODUCTORY CHEMISTRY.

BRANDON NGUYEN, BIOLOGY

FACULTY MENTOR(S): BRANDON BROWN

EVALUATING THE IMPACT OF INCENTIVES ON CLINICAL TRIAL PARTICIPATION

MONETARY INCENTIVES IN RESEARCH ARE FREQUENTLY USED TO SUPPORT PARTICIPANT RECRUITMENT AND RETENTION. HOWEVER, THERE ARE SCANT EMPIRICAL DATA REGARDING HOW RESEARCHERS DECIDE UPON THE TYPE AND AMOUNT OF INCENTIVES OFFERED. LIKEWISE, THERE IS LITTLE GUIDANCE TO ASSIST STUDY INVESTIGATORS AND INSTITUTIONAL REVIEW BOARDS (IRBs) IN THEIR DECISION-MAKING ON INCENTIVES. MONETARY INCENTIVES, IN ADDITION TO OTHER FACTORS SUCH AS THE RISK OF HARM OR OTHER INTANGIBLE BENEFITS, GUIDE INDIVIDUALS' DECISIONS TO ENROLL IN RESEARCH STUDIES. THESE FACTORS EMPHASIZE THE NEED FOR EVIDENCE-INFORMED GUIDANCE FOR STUDY INVESTIGATORS AND IRBs WHEN DETERMINING THE TYPE AND AMOUNT OF INCENTIVES TO PROVIDE TO RESEARCH PARTICIPANTS. THE SPECIFIC AIMS OF OUR RESEARCH PROJECT ARE TO (1) CHARACTERIZE KEY STAKEHOLDERS' VIEWS ON AND ASSESSMENTS OF INCENTIVES IN BIOMEDICAL HIV RESEARCH; (2) REACH CONSENSUS AMONG STAKEHOLDERS ON THE FACTORS THAT ARE CONSIDERED WHEN CHOOSING RESEARCH INCENTIVES, INCLUDING CONSENSUS ON THE RELATIVE IMPORTANCE OF SUCH FACTORS; AND (3) PILOT-TEST THE USE OF THE GUIDANCE DEVELOPED VIA AIMS 1 AND 2 BY PRESENTING STAKEHOLDERS WITH VIGNETTES OF HYPOTHETICAL RESEARCH STUDIES FOR WHICH THEY WILL CHOOSE CORRESPONDING INCENTIVE TYPES.

BY STUDYING THE ROLE OF INCENTIVES IN HIV CLINICAL TRIAL PARTICIPATION, WE WILL ESTABLISH A DECISION-MAKING PARADIGM TO GUIDE THE CHOICE OF INCENTIVES FOR HIV RESEARCH AND, EVENTUALLY, OTHER TYPES OF SIMILAR RESEARCH AND FACILITATE THE ETHICAL RECRUITMENT OF CLINICAL RESEARCH PARTICIPANTS.

BREEANN NOVASEL, MICROBIOLOGY

FACULTY MENTOR(S): QIXUAN WANG

MODELING CELL FATE SPECIFICATION MECHANISMS IN HAIR FOLLICLES

WE ALL HAVE HAIR, AND IT IS IMPORTANT TO MANY BIOLOGICAL FEATURES, SUCH AS CAMOUFLAGE AND THERMOREGULATION. HAIRS ARE PRODUCED INSIDE HAIR FOLLICLES (HFs), WHICH ARE MINI ORGANS WITHIN THE MAMMALIAN SKIN. DUE TO THEIR RICHNESS IN STEM CELLS, HFs ARE ABLE TO SPONTANEOUSLY REGENERATE THROUGH LIFE, A PROCESS BEING STRICTLY REGULATED. IT IS CRUCIAL TO UNDERSTAND THE CELL FATE SPECIFICATION MECHANISMS IN HFs, WHICH MAINTAIN THE FUNCTIONS OF THE HF AND REGULATE ITS GROWTH DYNAMICS. IN THIS PROJECT, WE DEVELOP A DATA-DRIVEN MATHEMATICAL MODEL TO STUDY THE CELL FATE SPECIFICATION MECHANISMS IN HFs, WHERE WE FIRST APPLY PSEUDOTIME ANALYSIS ON RECENTLY PUBLISHED HF SINGLE CELL RNA-SEQUENCING DATA, THEN APPLY BOOLEAN MODEL ON IT, WHICH ALLOW US TO IDENTIFY THE KEY FACTORS IN HF CELL FATE REGULATION.

UCHENNA NWAEGE, PHYSICS

FACULTY MENTOR(S): JOHN BARTON

SIMULATING & PREDICTING COMPLEX EVOLUTIONARY HISTORIES USING THE WRIGHT-FISHER MODEL & BAYESIAN INFERENCE

LIVING THINGS EVOLVE TO INCREASE THEIR CHANCES OF SURVIVAL WITHIN THEIR ENVIRONMENT. THE SAME PROCESS ALSO OCCURS FOR PATHOGENS SUCH AS VIRUSES OR BACTERIA WITHIN A HOST. BETTER UNDERSTANDING THE EVOLUTION OF ANTIBIOTIC RESISTANCE OR HOW PATHOGENS ESCAPE FROM IMMUNE RESPONSES MAY INFORM THE DESIGN OF BETTER TREATMENT TECHNIQUES AND VACCINES. EVOLUTIONARY MODELS SUCH AS THE WRIGHT-FISHER MODEL CAN SIMULATE SUCH PROCESSES. HOWEVER, THESE MODELS DEPEND ON KNOWING DETAILED PROPERTIES OF A PATHOGEN, SUCH AS ITS MUTATION RATE AND HOW MUTATIONS AFFECT ITS FITNESS. HERE WE STUDY HOW SUCH PROPERTIES CAN BE INFERRED FROM DATA, IN PARTICULAR, GENETIC SEQUENCES COLLECTED OVER TIME FROM A POPULATION. FIRST, WE WROTE CODE TO SIMULATE EVOLUTION FOLLOWING THE WRIGHT-FISHER MODEL FOR MULTIPLE SCENARIOS, INCLUDING

DIFFERENT LEVELS OF SELECTION AND DIFFERENT MUTATION RATES. WE COLLECTED VIRTUAL SAMPLES FROM THESE SIMULATIONS TO CLOSELY REFLECT SAMPLING CONSTRAINTS FOUND IN REAL WORLD DATA. WE THEN DEVELOPED A PROGRAM TO IMPLEMENT THE MARGINAL PATH LIKELIHOOD (MPL) METHOD, A STATISTICAL TECHNIQUE TO DETERMINE THE FITNESS EFFECTS OF MUTATIONS FROM EVOLUTIONARY DATA BASED ON CHANGES IN MUTANT FREQUENCIES OVER MULTIPLE GENERATIONS OF A POPULATION. OUR RESULTS DEMONSTRATE THAT THE MPL CAN STILL RELIABLY INFER SELECTION EVEN WHEN SAMPLES ARE COLLECTED WITH LARGE OR IRREGULAR GAPS IN TIME AND LIMITED NUMBERS OF SEQUENCES. SINCE THE RESULTS DEMONSTRATE THAT COMPLEX PROPERTIES OF PATHOGENS CAN SUCCESSFULLY BE INFERRED, WE WILL FURTHER DEVELOP THE MPL TO INFER THE MUTATION RATE OF PATHOGENS.

JONATHAN OGBOGU, BIOLOGY

FACULTY MENTOR(S): EMMA SIMMONS

IMPROVING PEDIATRIC HEALTH LITERACY THROUGH THE LENS OF ANIMATION

LOW HEALTH LITERACY IS PREVALENT, PARTICULARLY AMONG MEDICALLY UNDERSERVED COMMUNITIES. SHORT APPOINTMENT TIMES AND LIMITED INTERPRETING SERVICES ALSO HINDER HEALTH EDUCATION. LIMITED RESEARCH EXISTS ON THE USE OF ANIMATION TO DELIVER HEALTH EDUCATION FOR ADULTS, AND THERE ARE FEWER STUDIES ON PEDIATRIC POPULATIONS. UCR MINI MEDICAL SCHOOL (MMS) IS AN UNDERGRADUATE ORGANIZATION THAT PROVIDES HEALTH EDUCATION TO UNDERSERVED COMMUNITIES. THE MMS RESEARCH TEAM WORKS WITH PHYSICIANS TO DEVELOP ANIMATED HEALTH EDUCATION VIDEOS FOR PARENTS IN NEWBORN NURSERIES. THIS PROJECT FOCUSES ON IMPROVING BREASTFEEDING AND JAUNDICE LITERACY THROUGH ANIMATED VIDEOS. INVESTIGATORS FROM A NORTHERN AND SOUTHERN CALIFORNIA MEDICAL SCHOOL COLLABORATED WITH MMS TO DEVELOP THE VIDEOS. BOTH VIDEOS WERE WRITTEN AT A 5TH-GRADE LEVEL AND TRANSLATED INTO SPANISH AND ENGLISH. COMMUNITY MEMBERS SCREEN THESE VIDEOS TO DETERMINE THE EFFECTIVENESS OF THE VIDEOS IN REGARDS TO COMPREHENSIBILITY, LINGUISTIC ACCESSIBILITY, AND CULTURAL SENSITIVITY. MULTIPLE STAKEHOLDERS AT BOTH INSTITUTIONS ALSO REVIEWED THESE VIDEOS, WHICH WILL BE SCREENED IN THE AFFILIATED PEDIATRIC CLINICAL CARE SETTINGS. THE MMS RESEARCH TEAM COLLECTS THE PARTICIPANTS' RESPONSES FROM THE SURVEYS, THEN ANALYZE THOSE RESPONSES TO DETERMINE IF THE OBJECTIVES WERE COMPLETED. THIS PROJECT SERVED AS A PRELIMINARY EVALUATION FOR A FOLLOW-UP STUDY TO SCREEN THESE VIDEOS ON NEWBORN AND NURSERY FLOORS AT RIVERSIDE AND SAN FRANCISCO HOSPITALS. RESEARCHERS USED PRE-SURVEYS AND POST-SURVEYS TO EVALUATE THE FEASIBILITY AND IMPACT OF THESE VIDEOS. THERE IS HOPE THAT THIS RESEARCH MAY ALLOW FOR FUTURE WIDESPREAD USE OF ANIMATION AS A MORE EFFECTIVE EDUCATIONAL TOOL TO IMPROVE HEALTH LITERACY ACROSS VULNERABLE COMMUNITIES.

RACHEL PAREDES, NEUROSCIENCE

FACULTY MENTOR(S): MONICA CARSON

ANALYSIS OF MURINE MICROGLIAL PHENOTYPIC CHARACTERISTICS FOLLOWING CONTINUOUS INHALATION OF ALTERNARIA PARTICULATE MATTER

MICROGLIA, THE RESIDENT IMMUNE CELLS OF THE CENTRAL NERVOUS SYSTEM (CNS), ARE TASKED WITH MODULATING THE INNATE IMMUNE RESPONSE OF THEIR ENVIRONMENT. ALLERGIC REACTIONS INDUCED BY INHALATION OF AEROSOLIZED ALLERGENS HAVE BEEN KNOWN TO AFFECT THE CNS THROUGH OBSERVATIONS OF ALTERED BEHAVIOR AND IMPAIRED COGNITION IN BOTH MURINE AND HUMAN STUDIES, BUT NOT MUCH IS KNOWN REGARDING THE EXTENT TO WHICH ALLERGIC REACTIONS IN THE BODY CHANGE THE PHENOTYPIC STATE OF MICROGLIAL CELLS, AND THUS THE INNATE IMMUNE RESPONSE. TO ANALYZE MICROGLIAL PHENOTYPIC STATES IN THE MURINE HIPPOCAMPUS ACCORDING TO AGE FOLLOWING CONTINUOUS EXPOSURE TO ALTERNARIA AIRBORNE PARTICULATES, 16 BRAIN SECTIONS FROM A TOTAL OF 2 MICE CONTAINING THE CA1 REGION OF THE HIPPOCAMPUS WERE COLLECTED, IMMUNOHISTOCHEMICALLY STAINED WITH THE PAN-MICROGLIAL MARKER IBA1, AND QUANTIFIED USING NEUROLUCIDA 360. A SHOLL ANALYSIS WAS PERFORMED IN ORDER TO OBTAIN THE BRANCHING

RADIUS AND LENGTH OF MICROGLIAL RAMIFICATIONS AND PROVIDE QUANTIFIABLE EVIDENCE OF MICROGLIAL PHENOTYPIC STATUS. RESULTS ARE EXPECTED TO SHOW A CLASSICALLY ACTIVATED MICROGLIAL SIGNATURE WITH SHORTENED PROCESSES AND INCREASED INTERSECTIONS AT SPECIFIC CONCENTRIC RADII IN BOTH PUP AND ADULT MICE.

SAMIKSHA PATIL, NEUROSCIENCE

FACULTY MENTOR(S): EDWARD KORZUS

EXTRACTION OF LARGE DATA SETS FROM CORTICAL CALCIUM IMAGING

ONE-PHOTON CALCIUM IMAGING REQUIRES SEVERAL STAGES TO OBTAIN NEURONAL FLUORESCENCE EXTRACTION: MOTION CORRECTION, STITCHING OF SESSIONS, EXTRACTION OF CALCIUM ACTIVITY, AND QUALITY CONTROL. IN THE QUALITY CONTROL STAGE, THE FIRST STEP IS TO DETERMINE IF AN EXTRACTED REGION OF INTEREST (ROI) IS A NEURON OR AN ARTIFACT BASED ON THE PATTERN OF CALCIUM FLUORESCENCE. AFTER THE ROI HAS BEEN DETERMINED TO BE A NEURON, THE SECOND STEP IS TO MANUALLY CHECK IF ANY OTHER NEURONS IN CLOSE PROXIMITY ARE THE SAME OR DIFFERENT NEURONS. BOTH ARTIFACTS FROM EXTRACTION AND DUPLICATION OF NEURONS LEAD TO UNCERTAINTY WHEN TRACKING NEURONAL PATTERNS FOR BEHAVIORAL STUDIES. CURRENTLY, ARTIFACT DELETION IS A MANUAL PROCESS THAT IS TEDIOUS AND TIME-CONSUMING GIVEN THE NUMBER OF NEURONS EXTRACTED, THE NUMBER OF TRIALS, AND THE NUMBER OF SUBJECTS FOR A BEHAVIORAL EXPERIMENT. THE PURPOSE OF THIS STUDY IS TO PROVIDE A MATHEMATICAL AND STATISTICAL ANALYSIS TO AUTOMATE THE PROCESS OF IDENTIFYING ARTIFACTS BASED ON THE ACTIVITY OF CALCIUM FLUORESCENCE. THIS STUDY WILL USE A DEEP NEURAL NETWORK, DNN, A SUBSET OF ARTIFICIAL NEURAL NETWORK TO PRECISELY IDENTIFY ARTIFACTS. THE DNN WILL BE WILL BE CONSTRUCTED USING THE PROGRAMMING LANGUAGE MATLAB. THE PROGRAM WILL SPEED UP THE QUALITY CONTROL STAGE, IN ADDITION, THE PROGRAM WILL PROVIDE A CONSISTENT ANALYSIS FOR DETERMINING ARTIFACTS.

ALENA PHAM, BIOLOGY

FACULTY MENTOR(S): DAVID REZNICK

COLORATION IN DOMESTIC FEMALE POECILIA RETICULATA

THIS STUDY AIMS TO INVESTIGATE HOW DOMESTIC FEMALE POECILIA RETICULATA ARE CAPABLE OF EXPRESSING COLORATION AS WILD-TYPE FEMALES ARE NOT. POECILIA RETICULATA, COMMONLY KNOWN AS GUPPIES, HAVE XY SEX-DETERMINATION WHEREIN FEMALES ARE XX AND MALES ARE XY. COLORATION IN THIS SPECIES IS PREDOMINANTLY Y-LINKED, BUT THERE ARE ALSO SOME X-LINKED GENES. MALES DISPLAY COLORATION WHILE WILD-TYPE FEMALES NEVER DO; HOWEVER, THE FEMALES OF SOME STRAINS OF DOMESTIC GUPPIES HAVE MALE-LIKE COLOR PATTERNS. THE HYPOTHESIS TESTED IS THAT X-LINKED COLOR GENES ARE NORMALLY SUPPRESSED BY A REGULATORY GENE ON AN AUTOSOME THAT HAS BECOME DYSFUNCTIONAL IN DOMESTIC LINES, ALLOWING DOMESTIC FEMALE GUPPIES TO EXPRESS COLORATION. CROSSES BETWEEN DOMESTIC FEMALES AND WILD-TYPE MALES HAVE BEEN PERFORMED TO PRODUCE OFFSPRING THAT ARE HETEROZYGOUS FOR THE HYPOTHESIZED REGULATORY GENE, HAVING A DOMINANT FUNCTIONAL ALLELE AND A RECESSIVE DYSFUNCTIONAL ALLELE. THEN THE SIBLINGS OF THOSE CROSSES WILL BE MATED TOGETHER TO PRODUCE A SECOND GENERATION. IF THE HYPOTHESIS IS CORRECT, THEN NO FIRST GENERATION OFFSPRING PRODUCED FROM THE CROSSES WILL EXPRESS COLORATION, AND THE SECOND GENERATION WILL PRESENT A 1:3 RATIO OF COLOR-EXPRESSING FEMALES TO DULL PHENOTYPE FEMALES.

ADVYTH RAMACHANDRAN, BIOLOGY

FACULTY MENTOR(S): MARKO SPASOJEVIC

MISMATCH BETWEEN ADULT AND SEEDLING TREES SET THE STAGE FOR BIODIVERSITY CHANGE IN A DRY WESTERN FOREST

UNDERSTANDING THE FACTORS THAT STRUCTURE PLANT COMMUNITIES IS CRITICAL FOR PREDICTING BIODIVERSITY CHANGE. IMPORTANTLY, CHANGES IN THE RELATIVE IMPORTANCE OF THE FACTORS THAT STRUCTURE COMMUNITIES ACROSS LIFE STAGES (E.G., ADULTS VS. SEEDLINGS) MAY DETERMINE WHICH SPECIES WILL BE ABLE TO PERSIST UNDER CHANGING CONDITIONS. FOR EXAMPLE, IN FORESTS SEEDLINGS OFTEN HAVE NARROWER ENVIRONMENTAL TOLERANCES THAN ADULTS OF THE SAME SPECIES, AND THUS A CHANGING CLIMATE COULD LIMIT THE ABILITY OF SEEDLINGS TO SURVIVE AND RESULT IN CHANGES TO FOREST COMPOSITION. WITHIN THE 4HA SAN JACINTO FOREST DYNAMICS PLOT (SJFDP) IN SOUTHERN CALIFORNIA, WE SURVEYED SEEDLINGS ACROSS 256 1M² PLOTS AND COMPARED OUR SURVEY TO A RECENT SURVEY OF ADULT TREES TO EXAMINE HOW THE FACTORS THAT STRUCTURE FOREST COMPOSITION DIFFER BETWEEN SEEDLINGS AND ADULTS. WE FOUND A SIGNIFICANT MISMATCH BETWEEN ADULTS AND SEEDLINGS. COMPARED TO THE 18 SPECIES OF ADULTS, WE ONLY FOUND 11 SPECIES OF SEEDLINGS, AND THAT OAKS MADE UP 75% OF ALL SEEDLINGS WHILE ONLY MAKING UP 45% OF ADULTS. MOREOVER, WE FOUND THAT VARIATION IN ADULT COMPOSITION ACROSS THE SJFDP WAS PRIMARILY EXPLAINED BY SPATIAL PROCESSES (41.7%) WITH ENVIRONMENTAL PROCESSES ONLY EXPLAINING 18.2%. IN CONTRAST, SEEDLING COMPOSITION WAS WEAKLY PREDICTED BY OUR MEASURED VARIABLES WITH 25.8% EXPLAINED BY ADULT COMPOSITION, 11.8% EXPLAINED BY A COMBINATION OF OUR OTHER VARIABLES, AND 62.4% UNEXPLAINED. OUR RESULTS SUGGEST THAT THIS FOREST IS PRIMED FOR CHANGE WITH OAKS LIKELY BECOMING THE DOMINANT SPECIES IN THIS FUTURE, RESULTING IN SUBSTANTIAL CHANGES TO BIODIVERSITY AND ECOSYSTEM FUNCTION.

MONIQUE RAMIREZ, BIOLOGY

FACULTY MENTOR(S): ILANA BENNETT

BASAL GANGLIA NETWORK CONTRIBUTIONS TO ASSOCIATIVE AND SKILL LEARNING

LEARNING A NEW SKILL (E.G., DRIVING) INVOLVES DIFFERENT TYPES OF PROCESSES, SUCH AS FORMING CONNECTIONS BETWEEN STIMULI (E.G., BRAKING WHEN YOU SEE A RED LIGHT; ASSOCIATIVE LEARNING) AND INCREASING TASK PERFORMANCE WITH PRACTICE (E.G., PARKING GETS BETTER OVER TIME; SKILL LEARNING). THESE DIFFERENT TYPES OF LEARNING INVOLVE BASAL GANGLIA NETWORKS THAT CONNECT THE CAUDATE TO DORSAL LATERAL PREFRONTAL CORTEX (ASSOCIATIVE LOOP) AND THE PUTAMEN TO MOTOR CORTEX (MOTOR LOOP). HOWEVER, IT IS UNKNOWN WHETHER THESE LOOPS UNIQUELY RELATE TO EACH TYPE OF LEARNING OR IF THEY ARE INVOLVED IN BOTH TYPES OF LEARNING. TO TEST THIS, IN THE CURRENT STUDY, 28 HEALTHY YOUNGER ADULTS PERFORMED AN ASSOCIATIVE LEARNING TASK (TRIPLET LEARNING TASK) AND UNDERWENT DIFFUSION-WEIGHTED MAGNETIC RESONANCE IMAGING. SIGNIFICANT ASSOCIATIVE LEARNING WAS SEEN AS BETTER PERFORMANCE ON MEASURES THAT COMBINED REACTION TIME AND ACCURACY TO FREQUENTLY VERSUS INFREQUENTLY OCCURRING CUE-CUE-TARGET EVENT TRIPLETS. SIGNIFICANT SKILL LEARNING WAS SEEN AS FASTER REACTION TIMES OVER THE COURSE OF LEARNING. DIFFUSION IMAGING TRACTOGRAPHY WAS USED TO CONSTRUCT THE WHITE MATTER TRACTS CONNECTING THESE BASAL GANGLIA LOOPS AND MULTICOMPARTMENT DIFFUSION METRICS WERE EXTRACTED FROM EACH TRACT. RESULTS REVEALED THAT BETTER MICROSTRUCTURE (LOWER DIFFUSION) FROM BOTH TRACTS WAS SIGNIFICANTLY CORRELATED TO BETTER ASSOCIATIVE LEARNING, BUT ONLY BETTER MICROSTRUCTURE IN THE MOTOR LOOP TRACT WAS RELATED TO SKILL LEARNING. OUR RESEARCH SUPPORTS A LARGE LITERATURE SHOWING THAT THE BASAL GANGLIA LOOPS CONTRIBUTE TO LEARNING, WITH THE ASSOCIATIVE LOOP INVOLVED IN MULTIPLE TYPES OF LEARNING BUT THE MOTOR LOOP UNIQUELY RELATE TO SKILL LEARNING.

BRIANNA RAMIREZ, BIOCHEMISTRY

FACULTY MENTOR(S): DECLAN F. MCCOLE

EXAMINING THE EFFECTS OF AGRICULTURE DUST EXPOSURE ON INTESTINAL PERMEABILITY AND EPITHELIAL CELL DIFFERENTIATION IN MICE

LONG-TERM EXPOSURE TO SWINE FARM DUST CAN HAVE DETRIMENTAL RESPIRATORY EFFECTS ON FARM WORKERS. INTERESTINGLY, POLLUTANTS FROM AGRICULTURAL DUST CAN ALSO PROMOTE GASTROINTESTINAL DISEASE SYMPTOMS. PREVIOUS RESEARCH HAS SHOWN THAT SWINE FARM DUST IS COMPOSED OF ULTRAFINE PARTICLES, GRAM-NEGATIVE BACTERIA, AND BACTERIAL LIPOPOLYSACCHARIDES (LPS). RECENT WORK FROM OUR LABORATORY HAS SHOWN THAT WHEN C57BL/6J MICE ARE INTRANASALLY EXPOSED TO 12.5% HOG DUST EXTRACT (HDE) FOR 3 WEEKS, THERE IS A SIGNIFICANT INCREASE IN INTESTINAL PERMEABILITY, INCREASED mRNA EXPRESSION OF THE GOBLET CELL MARKER MUC2 (A KEY COMPONENT OF PROTECTIVE MUCOUS) IN DISTAL COLON EPITHELIAL CELLS (UNPAIRED T-TEST, $P=0.0099$, $N=3-5$ /GROUP), AND EVIDENCE OF LOW-GRADE ENDOTOXEMIA (UNPAIRED T-TEST, $P<0.0001$; $N=5-6$ /GROUP). TO EXPLORE THE ROLE OF LPS IN INCREASING INTESTINAL PERMEABILITY OF HDE-TREATED MICE, WE WILL EXAMINE THE EXPRESSION OF PROTEINS (TLR-4, CD14, MD-2 AND MYD88) INVOLVED IN THE MYD88 SIGNALING PATHWAY AND INVESTIGATE INTESTINAL GOBLET CELL DIFFERENTIATION. WE HYPOTHESIZE THAT INTRANASAL EXPOSURE TO HDE WILL INCREASE THE EXPRESSION OF PROTEINS ASSOCIATED WITH THE ACTIVATION OF MYD88 SIGNALING AND ALTER GOBLET CELL PRODUCTION. WESTERN BLOT ANALYSIS FOUND NO SIGNIFICANT DIFFERENCES IN THE EXPRESSION OF MYD88 IN ILEUM EPITHELIAL CELLS (UNPAIRED T-TEST, $P=0.5368$, $N=5-6$ /GROUP). HOWEVER, FURTHER EXAMINATION OF OTHER PROTEINS INVOLVED IN MYD88 ACTIVATION IS NEEDED. ADDITIONALLY, WE ARE CURRENTLY INVESTIGATING GOBLET CELL DIFFERENTIATION FOLLOWING HDE TREATMENT. COLLECTIVELY, THESE DATA AIM TO CHARACTERIZE THE EFFECTS OF AGRICULTURAL DUST EXPOSURE ON INTESTINAL BARRIER FUNCTION, AND BETTER DEFINE THE ROLE(S) OF THE GUT-LUNG AXIS IN THE DEVELOPMENT OF INTESTINAL AND RESPIRATORY DISEASES.

OSVALDO RAMIREZ, STATISTICS

FACULTY MENTOR(S): ESRA KURUM, ANALISA FLORES

A SURVIVAL ANALYSIS PROJECT OF TWO BIOMEDICAL DISEASES: IDENTIFYING FACTORS ASSOCIATED WITH MORTALITY OF PATIENTS WITH PRIMARY BILIARY CHOLANGITIS (PBC) AND CORONAVIRUS DISEASE 2019 (COVID-2019)

THE FOCUS OF THIS RESEARCH PROJECT IS TO PERFORM SURVIVAL ANALYSIS ON TWO MEDICAL DATA SETS - THE MAYO CLINIC PRIMARY BILIARY CHOLANGITIS (PBC) DATA AND COVID-19 DATA COLLECTED BY THE OPEN COVID-19 DATA WORKING GROUP. THE PBC DATA WAS COLLECTED BETWEEN 1974 AND 1984 TO IDENTIFY FACTORS (SUCH AS AGE, SEX, AND OTHER COMORBIDITIES) AFFECTING THE RISK OF DEATH FOR PATIENTS WITH PBC, A DISEASE THAT DESTROYS SMALL BILE DUCTS IN THE LIVER. THE COVID-19 DATA, COLLECTED BETWEEN FEBRUARY 2020 AND MARCH 2021, PROVIDES PATIENT-LEVEL INFORMATION THAT IS USED TO UNDERSTAND FACTORS (SUCH AS DEMOGRAPHICS AND INITIAL SYMPTOMS) CONTRIBUTING TO THE RISK OF DEATH FROM COVID-19. THE INITIAL STEP IN THE ANALYSES IS DATA WRANGLING TO FORMAT AND PREPARE THE DATA FOR ANALYSES. EXPLORATORY DATA ANALYSIS METHODS SUCH AS DESCRIPTIVE STATISTICS AND STATISTICAL GRAPHICS ARE EMPLOYED TO SUMMARIZE AND VISUALIZE THE DATA. THE SURVIVAL DATA ANALYSIS METHODS INCLUDE OBTAINING KAPLAN-MEIER ESTIMATORS TO EXPLORE HOW THE RISK OF THE EVENT OF INTEREST CHANGES OVER TIME AND APPLYING COX PROPORTIONAL HAZARDS MODELS TO DETERMINE THE EFFECT OF EACH FACTOR ON THE RISK OF AN EVENT. THE ANALYSIS IS PERFORMED IN R STATISTICAL SOFTWARE AND THE R CODE IS PUBLICLY AVAILABLE.

VAISHNAVI RAVI, BIOLOGY

FACULTY MENTOR(S): RICHARD CARDULLO

ANALYSIS OF MOSQUITO SPERM FLAGELLAR WAVEFORMS TO EVALUATE SIGNALING PATHWAYS NECESSARY FOR SUCCESSFUL FERTILIZATION

MOSQUITOES ARE VECTORS OF MANY DISEASES THAT RESULT IN NUMEROUS HUMAN DEATHS WORLDWIDE. THE OVERALL GOAL OF THIS STUDY WAS TO INTERFERE WITH MALES' SPERM MOTILITY PATTERN BY REGULATING ENTRY OF EXTRACELLULAR CALCIUM IN ORDER TO FIND A POTENTIAL CONTROL METHOD. PRELIMINARY STUDIES ON *CULEX QUINQUEFASCIATUS* SHOWED THAT FOLLOWING ACTIVATION, SPERM PROGRESS THROUGH THREE DISTINCT FLAGELLAR WAVEFORM PATTERNS RESULTING IN INCREASED VELOCITY AND PROGRESSIVE MOTILITY. IN THESE EXPERIMENTS, WE INVESTIGATED HOW DIFFERENT DIVALENT CATIONS AFFECTED MOSQUITO SPERM MOTILITY. ZINC AND NICKEL IONS WERE USED AS POTENTIAL INHIBITORS OF Ca^{2+} ENTRY THAT WOULD ULTIMATELY AFFECT THE DOWNSTREAM PHOSPHORYLATION OF FLAGELLAR PROTEINS. DARK FIELD MICROSCOPY AND IMAGE PROCESSING WERE USED TO ASSESS VARIOUS FLAGELLAR PARAMETERS (E.G., FLAGELLAR BEAT FREQUENCY, MEAN HEAD VELOCITY, ETC.) IN RESPONSE TO THE ADDITION OF Ni^{2+} AND Zn^{2+} . IN THE CASE OF BOTH CATIONS, WE OBSERVED SIGNIFICANT DECREASES IN THOSE PARAMETERS RELATIVE CONTROLS.

CITALI RIVAS, BIOLOGY

FACULTY MENTOR(S): XOCHITL CHAVEZ

COVID-19 PERFORMING ARTS: REHEARSAL STRUCTURE, INTERPERSONAL RELATIONSHIPS, AND PERFORMANCE

THE COVID-19 PANDEMIC HAS PRESENTED A LOT OF CHALLENGES IN LEARNING AS THE ENTIRE FORMAT OF TEACHING HAS MOVED TO ONLINE PLATFORMS. BUT WHAT HAPPENS WHEN THESE ONLINE PLATFORMS CANNOT AID IN TEACHING ALL CLASSES? MOVING REHEARSALS TO AN ONLINE FORMAT HAS BEEN ANYTHING BUT EASY FOR MANY PERFORMING ARTS GROUPS, AS THE TOOLS THAT OTHER CLASSES USE SIMPLY DO NOT HAVE THE SAME BENEFITS FOR PERFORMERS. ADDITIONALLY, IN-PERSON REHEARSALS ARE NO LONGER THE SAME AS THEY ONCE WERE PRIOR TO THE PANDEMIC. THE GOALS OF MY CAPSTONE PROJECT ARE TO: 1) DOCUMENT THE CHALLENGES OF VIRTUAL REHEARSALS, 2) EXAMINE THE EFFECTS OF VIRTUAL REHEARSALS ON REHEARSAL STRUCTURE, INTERPERSONAL RELATIONSHIPS, AND PERFORMANCES IN DIFFERENT PERFORMING ARTS GROUPS, 3) EXAMINE THE DIFFERENCES AND CHALLENGES BETWEEN IN-PERSON REHEARSALS PRIOR TO THE PANDEMIC AND IN-PERSON REHEARSALS AFTER QUARANTINE, 4) EXAMINE THE EFFECTS OF RETURNING TO IN-PERSON REHEARSALS ON REHEARSAL STRUCTURE, INTERPERSONAL RELATIONSHIPS, AND PERFORMANCES IN DIFFERENT PERFORMING ARTS GROUPS. THROUGH ETHNOGRAPHIC INTERVIEWS AND OBSERVATIONAL FIELD WORK, THIS RESEARCH WILL FEATURE PERFORMING ART GROUPS OF VARIOUS INSTRUMENTALISTS, VOCALISTS, DANCERS, AND CONDUCTORS/DIRECTORS IN HOPES TO LEARN WHAT IS WORKING IN ONLINE REHEARSALS AND THE TRANSITION BACK TO IN-PERSON REHEARSALS AND WHAT IS NOT.

MATINE RUBIN, STATISTICS

FACULTY MENTOR(S): PRUE TALBOT

EXPLORATORY MULTI-OMICS ON THE EFFECTS OF COMBUSTIBLE AND ELECTRONIC CIGARETTE SMOKE

THERE ARE AN ESTIMATED 34.1 MILLION CIGARETTE SMOKERS IN THE UNITED STATES, WITH MORE THAN 16 MILLION OF THOSE SMOKERS LIVING WITH SMOKING-RELATED DISEASE. IN RECENT YEARS, ELECTRONIC CIGARETTES (E-CIGARETTES) HAVE BEEN GAINING POPULARITY AS A TOBACCO-FREE REPLACEMENT TO COMBUSTIBLE TOBACCO CIGARETTES. WHILE USING E-CIGARETTES, OR "VAPING", IS PURPORTEDLY LESS HARMFUL THAN SMOKING TRADITIONAL TOBACCO PRODUCTS, IT IS NOT ENTIRELY SAFE DUE TO THE NICOTINE AND CHEMICAL FLAVORING AGENTS THAT ARE FOUND IN THE E-CIGARETTE LIQUID. AS A RESULT, THE GROWING POPULARITY OF E-CIGARETTES HAS CAUSED MANY USERS

TO EXPERIENCE DETRIMENTAL E-CIGARETTE OR VAPING PRODUCT USE-ASSOCIATED LUNG INJURY (EVALI), CONTRIBUTING TO THE SEVERITY OF E-CIGARETTE USE AS A PUBLIC HEALTH ISSUE. PREVIOUS RESEARCH HAS DEMONSTRATED POSSIBLE ADVERSE EFFECTS OF SMOKING AND VAPING ON A CELLULAR LEVEL, BUT THERE IS AN ABSENCE OF RESEARCH REGARDING THEIR EFFECTS ON BIOLOGICAL PATHWAYS AS A WHOLE. IN THIS RESEARCH PROJECT, I WILL BE TAKING A MULTI-OMICS APPROACH TO ADDRESSING THIS TOPIC BY ANALYZING PROTEIN AND GENE EXPRESSION CHANGES AS A RESULT OF SMOKE OR AEROSOL EXPOSURE. BY CONDUCTING COMPARATIVE PROTEOMICS AND RNA SEQUENCING IN HUMAN SUBJECTS THAT HAVE BEEN EXPOSED TO EITHER COMBUSTIBLE CIGARETTE OR E-CIGARETTE SMOKE, I HOPE TO CONTRIBUTE TO A COMPREHENSIVE UNDERSTANDING OF THE RISKS ASSOCIATED WITH USING THESE SMOKING-RELATED SUBSTANCES. I HYPOTHESIZE THAT MANY BIOLOGICAL PATHWAYS WILL BE NEGATIVELY AFFECTED AS A RESULT OF SMOKE EXPOSURE, SPECIFICALLY THOSE ASSOCIATED WITH CANCER, ORAL AND LUNG DISEASES, AND THE IMMUNE RESPONSE.

ZAARA SAID, BIOLOGY

FACULTY MENTOR(S): DAVID LO

ATTITUDES AND APPROACH OF FACULTY AND STUDENTS TOWARD RACIAL BIAS IN MEDICAL EDUCATION

RACIAL BIAS IN THE MEDICAL FIELD IS A PROMINENT AND SYSTEMIC ISSUE THAT CAN RESULT IN PATIENTS NOT RECEIVING THE CARE THEY NEED. THE AIM OF THIS PROJECT IS TO DETERMINE HOW RACIAL BIAS IN THE MEDICAL FIELD HAS BEEN ADDRESSED AND APPROACHED IN MEDICAL SCHOOL CURRICULUM, AS WELL AS MEDICAL STUDENTS' OWN EXPERIENCES WITH RACIAL BIAS IN THIS FIELD. WE HOPE TO GAIN INSIGHT INTO HOW RACIAL BIAS MAY BE PERPETUATED SYSTEMICALLY THROUGH THE WAY RACE IS DISCUSSED IN THE CONTEXT OF MEDICAL EDUCATION. THIS WAS ACCOMPLISHED BY SURVEYING UNIVERSITY OF CALIFORNIA, RIVERSIDE MEDICAL STUDENTS AND INSTRUCTORS. RESPONSES TO THE SURVEY WILL HELP US UNDERSTAND THE ATTITUDES OF MEDICAL SCHOOL STUDENTS AND PROFESSORS ABOUT RACE AND HOW IT IS RELEVANT TO MEDICINE. WE ARE INTERESTED TO SEE HOW DIFFERENT RACIAL GROUPS ANSWER THE QUESTIONS AND IF THERE IS A SIGNIFICANT DIFFERENCE IN THE WAY PARTICIPANTS RESPOND. ADDITIONALLY, WE HOPE TO UNDERSTAND HOW PERSPECTIVES ON RACE DIFFER BETWEEN MEDICAL STUDENTS AND PROFESSORS AND IF THE AMOUNT OF EXPERIENCE IN THE MEDICAL FIELD INFLUENCES THESE PERSPECTIVES. THE FUTURE IMPACT OF STUDYING THIS TOPIC MAY LEAD TO CHANGES IN THE WAY MEDICINE IS TAUGHT AND PRACTICED SO PATIENTS CAN RECEIVE A HIGHER QUALITY OF CARE, REGARDLESS OF THEIR RACIAL BACKGROUND.

GABRIELA SALAZAR SORIANO, BIOLOGY

FACULTY MENTOR(S): CAROLYN RASMUSSEN

CHARACTERIZATION OF TANGLED62

CELL DIVISION IS A FUNDAMENTAL PROCESS IN EUKARYOTIC GROWTH AND DEVELOPMENT. DUE TO THE SESSILE NATURE OF PLANTS, ABNORMAL CELL DIVISION PLANE POSITIONING CAN HAVE DETRIMENTAL EFFECTS. A FORWARD GENETIC SCREEN OF ZEA MAYS (MAIZE) IDENTIFIED A MUTANT WITH ASYMMETRIC CELL DIVISION DEFECTS CALLED TANGLED62 (TAN62). COMPARED TO WILD-TYPE PLANTS, TAN62 HAS STUNTED GROWTH AND OPAQUE, INSTEAD OF TRANSLUCENT, KERNELS. A PREVIOUSLY IDENTIFIED MUTANT, OPAQUE1 (O1), HAS SIMILAR PHENOTYPES TO TAN62. OPAQUE1 ENCODES A MYOSIN XI MOTOR PROTEIN THAT'S INVOLVED IN THE MOVEMENT OF CARGO ON ACTIN FILAMENTS. O1 IS A LOSS-OF-FUNCTION MUTANT THAT LEADS TO MISGUIDED PHRAGMOPLASTS THAT DO NOT MEET AT THE CORRECT DIVISION SITE. HOWEVER, TAN62 HAS A MORE SEVERE PHENOTYPE THAN O1. DUE TO THE SIMILAR PHENOTYPES, I PERFORMED A COMPLEMENTATION TEST THAT REVEALED THAT TAN62 IS ALLELIC TO O1. I HYPOTHESIZE THAT TAN62 IS A SINGLE NUCLEOTIDE POLYMORPHISM IN THE DNA SEQUENCE ENCODING THE HEAD DOMAIN OF MYOSIN XI, WHERE BINDING TO ACTIN OCCURS. THE MORE SEVERE PHENOTYPE OF TAN62 MAY BE CAUSED BY THE MYOSIN XI PROTEIN CAPTURING AN INTERACTOR AND NOT DELIVERING IT TO THE CORRECT SITE. TO TEST THIS HYPOTHESIS, I AM SEQUENCING THE TAN62 MUTATION WITHIN THE OPAQUE1 LOCUS. FUTURE WORK WILL INCLUDE CONDUCTING CO-IMMUNOPRECIPITATION AND A BIMOLECULAR FLUORESCENCE COMPLEMENTATION ASSAY TO DETERMINE IF INTERACTIONS WITH MYOSIN XI INTERACTORS HAVE CHANGED IN TAN62. CHARACTERIZATION OF TAN62 CAN HELP FURTHER UNDERSTAND

THE ROLE OF THE CYTOSKELETON AND MYOSIN XI PROTEINS IN CELL DIVISION.

RACHEL SALIM, BIOLOGY

FACULTY MENTOR(S): EYRN PARKS

A LITERATURE REVIEW ON FACTORS ASSOCIATED WITH ADVERSE REACTIONS TO THE COVID-19 PANDEMIC: THE IMPACT ON U.S. COLLEGE STUDENTS

EVERYONE REGARDLESS, OF AGE, SEX, GENDER, AND SOCIOECONOMIC STATUS, HAS BEEN AFFECTED BY THE COVID-19 PANDEMIC EITHER DIRECTLY OR INDIRECTLY WITHIN THE PAST THREE YEARS. COLLEGE STUDENTS HAVE FACED A VARIETY OF PERSONAL, ACADEMIC, SOCIAL, AND DEVELOPMENTAL CHALLENGES AS UNIVERSITIES STRUGGLED TO ADAPT INSTRUCTION AND CAMPUS SERVICES TO MEET THEIR NEEDS. THIS WAS MORE DIFFICULT DUE TO VARIABILITY IN RATES OF INFECTION, POLITICAL ENVIRONMENT, AND LEVEL OF COOPERATION BETWEEN STATE AND LOCAL GOVERNMENTS DURING A GLOBAL CRISIS. THE UNPREDICTABLE NATURE OF THE PANDEMIC HAS MADE THIS DEVELOPMENTAL PROCESS AN UNCHARTED TERRITORY FOR THE STUDENT. RESEARCH IS CRUCIAL BECAUSE THE COVID-19 PANDEMIC IS STILL ONGOING AND WILL CONTINUE TO AFFECT THE UPCOMING GENERATION. THERE MUST BE AN UNDERSTANDING OF HOW THE PANDEMIC IS AFFECTING THE STUDENT'S PSYCHOLOGICAL WELL-BEING AND SOCIAL FUNCTIONING, OR THERE WILL NOT BE A BASIS UPON WHICH TO HELP THEM. A LITERATURE REVIEW WILL BE CONDUCTED ON HOW THESE ADVERSE REACTIONS ARE BEING EXPRESSED AND WHICH FACTORS ARE ASSOCIATED WITH OR HAVE MITIGATED THE NEGATIVE EFFECTS OF THE PANDEMIC OR RESPONSES TO THE PANDEMIC. KNOWLEDGE OF THE SHORT AND LONG-TERM CONSEQUENCES OF THE PANDEMIC IS CRUCIAL TO ADAPT TO THE CURRENT ENVIRONMENT AND FUTURE PANDEMICS. THIS RESEARCH WILL ATTEMPT TO HIGHLIGHT THE MOST IMPORTANT ISSUES SO THAT FAMILIES, UNIVERSITY PERSONNEL, AND GOVERNING OFFICIALS CAN UNDERSTAND WHAT TYPE OF HELP IS NEEDED AND HOW IT MIGHT BE DELIVERED TO COLLEGES IN THE UNITED STATES. THERE WILL ALSO BE SUGGESTIONS ON WHERE TO TARGET FUTURE RESEARCH IN THIS AREA.

YANET SALMERON, BIOLOGY

FACULTY MENTOR(S): AMALIA CABEZAS

EFFECTS OF THE COVID-19 PANDEMIC ON THE RETENTION RATES FOR LATINO UNIVERSITY STUDENTS

THE COVID-19 PANDEMIC HAS HAD AN IMMENSE IMPACT ON VARIOUS SECTORS OF SOCIETY HIGHLIGHTING THE DISPARITIES THAT EXIST WITHIN THEM. THIS HAS BECOME MOST EVIDENT IN EDUCATIONAL INSTITUTIONS. EVEN THOUGH THERE WAS AN INCREASE OF LATINO STUDENTS ENROLLING IN HIGHER EDUCATION INSTITUTIONS BEFORE THE PANDEMIC, IN THE PAST FEW MONTHS COVID-19 HAS HAD A SERIOUS IMPACT ON THE PERSONAL LIVES OF MANY LATINO STUDENTS, ULTIMATELY THREATENING THE RETENTION RATE OF THESE COLLEGE STUDENTS NATIONWIDE. THIS CAPSTONE PROJECT WILL EXAMINE AND IDENTIFY SOME COMPLICATIONS FACED BY LATINO STUDENTS AT THE UNIVERSITY OF CALIFORNIA-RIVERSIDE BROUGHT FORTH BY THE COVID-19 PANDEMIC AND THE IMPACT ON THEIR EDUCATIONAL JOURNEYS. THE DATA USED IN THIS PROJECT WILL BE OBTAINED VIA RECENTLY PUBLISHED SOURCES, DATA FROM THE UNIVERSITY OF CALIFORNIA OFFICE OF THE PRESIDENT, LATINO STUDENT PROGRAMS AT UCR, AND PERSONAL ANECDOTES. BY THE END OF THE PROJECT, COMMONLY RECURRING ECONOMIC AND PERSONAL HARDSHIPS FACED BY LATINOS DURING THE COVID-19 PANDEMIC WILL BE IDENTIFIED. IN ADDITION, THE IMPACT OF THESE HARDSHIPS ON THE RETENTION RATES FOR LATINO STUDENTS WILL BE EXPLORED FOR THE CURRENT 2021-2022 SCHOOL YEAR & THE ACADEMIC YEARS THAT ARE YET TO FOLLOW. FINALLY, THE PROJECT WILL IDENTIFY AND SUGGEST SOME POSSIBLE POLICY CHANGES AT THE STATE AND FEDERAL LEVEL AND AT THE UNIVERSITY OF CALIFORNIA-RIVERSIDE, TO LESSEN THE IMPACT OF THESE ECONOMIC AND SOCIAL DISPARITIES ON LATINO STUDENTS AT UCR.

CONNOR SCHOFIELD, NEUROSCIENCE

FACULTY MENTOR(S): THOMAS SY

LEADERS' PERCEPTIONS OF THEMSELVES AND THEIR EFFECTS ON THEIR PERCEPTION OF FOLLOWERS

IMPLICIT LEADERSHIP THEORIES (ILTs) AND IMPLICIT FOLLOWERSHIP THEORIES (IFTs) ARE POSITIVE AND NEGATIVE TRAITS THAT WE TYPICALLY ASSOCIATE WITH LEADERS AND FOLLOWERS. ADDITIONALLY, CURRENT RESEARCH SUGGESTS THAT EVEN IN MODERN DAY, WOMEN STILL FACE STIGMA AGAINST THEIR LEADERSHIP. IN SOME CASES, THIS STIGMA HAS BEEN FOUND TO NEGATIVELY IMPACT FEMALE LEADERS' PERFORMANCE AND LEGITIMACY AS LEADERS. FURTHER, WOMEN LEADERS HAVE TYPICALLY BEEN ASSOCIATED WITH TRAITS THAT ARE NOT ASSOCIATED WITH THE TYPICALLY MASCULINE CONSTRUALS OF DESIRABLE LEADERSHIP TRAITS. TO FURTHER EXAMINE HOW THESE CONSTRUCTS INFORM ONE ANOTHER, THIS STUDY ADDRESSED THE DEARTH OF RESEARCH ON WHETHER INDIVIDUALS' ILTs OF THEMSELVES ARE RELATED TO THEIR PERCEPTIONS OF TYPICAL FOLLOWERS (IFT's). ADDITIONALLY, THIS STUDY EXAMINED THE ROLE OF GENDER BY COMPARING INDIVIDUALS IDENTIFYING AS MALE AND FEMALE ON THEIR ILT PROTOTYPES AND ANTIPROTOTYPES. A SAMPLE OF 103 LEADERS WERE RECRUITED TO EXAMINE THEIR ILT'S AND THEIR PERCEPTION OF TYPICAL FOLLOWER IFT. CORRELATIONAL ANALYSES REVEALED SMALL BUT SIGNIFICANT RELATIONSHIPS BETWEEN SELF-ILT PROTOTYPES AND TYPICAL IFT PROTOTYPES, AS WELL AS SELF-ILT ANTIPROTOTYPES AND IFT ANTIPROTOTYPES. THIS IMPLIES THAT, TO AN EXTENT, OUR BELIEFS IN THEMSELVES AS LEADERS IS RELATED TO HOW WE PERCEIVE FOLLOWERS AS A WHOLE. ADDITIONALLY, RESULTS REVEALED THAT THERE ARE SIGNIFICANT DIFFERENCES BETWEEN MEN AND WOMEN, SUCH THAT MEN ASSOCIATED THEMSELVES MORE STRONGLY WITH BOTH PROTOTYPES AND ANTI-PROTOTYPES OF LEADERSHIP THAN WOMEN. THE IMPLICATIONS OF THIS STUDY SUGGEST THAT GENDER PLAYS A ROLE IN HOW LEADERS PERCEIVE THEMSELVES AND CAN INFORM FUTURE RESEARCH ON THE EFFECTS OF GENDER ON LEADERSHIP.

NICOLE SHAD, BIOLOGY

FACULTY MENTOR(S): AARON SEITZ

USING COMPUTERIZED COGNITIVE TRAINING AS A POTENTIAL INTERVENTION METHOD FOR MITIGATING THE EFFECTS OF GENERALIZED ANXIETY DISORDER (GAD) IN UNIVERSITY STUDENTS

IN RECENT YEARS, MANY STUDIES HAVE USED ONLINE SURVEYS TO ASSESS THE MENTAL HEALTH STATUS OF UNIVERSITY STUDENTS. HOWEVER, ONLY A FEW STUDIES HAVE REPORTED OR SUGGESTED POSSIBLE INTERVENTIONS FOR MITIGATING THE EFFECTS OF MENTAL DISORDERS. THE PURPOSE OF THIS STUDY IS TO USE COMPUTERIZED COGNITIVE TRAINING AS A POSSIBLE INTERVENTION METHOD FOR REDUCING THE EFFECTS OF GENERALIZED ANXIETY DISORDER IN A SAMPLE OF PUBLIC UNIVERSITY STUDENTS. ADDITIONALLY, WE WANT TO IDENTIFY POTENTIAL DEMOGRAPHIC FACTORS THAT CONTRIBUTE THE MOST TO THE PREVALENCE OF GAD AND STRESS IN UNIVERSITY STUDENTS. THE DATA WAS COLLECTED VIA AN ONLINE SURVEY THAT WAS GIVEN TO PARTICIPANTS UPON COMPLETION OF INFORMED CONSENT. THE SURVEY WAS BASED ON THE GENERALIZED ANXIETY DISORDER QUESTIONNAIRE (GAD-7) TO MEASURE THE ANXIETY LEVELS OF THE SAMPLE PARTICIPANTS. ADDITIONALLY, THE DEMOGRAPHICS SURVEY WAS USED TO ISOLATE POTENTIAL RISK FACTORS FOR TRIGGERING ANXIETY AND STRESS. COMPARISON TESTS WILL BE USED TO EVALUATE THE DATA FROM THE SURVEY. IN ADDITION TO COMPLETING THE SURVEYS, THE PARTICIPANTS ALSO PERFORMED A VARIETY OF COGNITIVE ACTIVITIES AS PART OF THE RECOLLECT ASSESSMENT BATTERY AS A POSSIBLE INTERVENTION METHOD. THE RESULTS WILL BE PRESENTED BASED ON THE DATA FROM A CURRENTLY PENDING STUDY. DESPITE THE UNCERTAIN NATURE OF ALL SCIENTIFIC ENDEAVORS, MORE PROFOUND RESEARCH INTO TESTING NON-PHARMACEUTICAL METHODS SUCH AS COGNITIVE TRAINING SIGNALS A NEW MEANS FOR TREATING MENTAL HEALTH DISORDERS WITHOUT COMPROMISING OTHER BODY SYSTEMS DUE TO HEAVY RELIANCE ON MEDICATION. ADDITIONALLY, THE COST-EFFECTIVE NATURE OF THIS NON-INVASIVE TREATMENT WILL ENCOURAGE MORE PARTICIPATION FOR FUTURE STUDIES.

NABEEL SHAIKH, BIOCHEMISTRY**PHYU HTET, BIOLOGY**

FACULTY MENTOR(S): WENDY SALTZMAN

PARENTAL BEHAVIOR OF THE BIPARENTAL CALIFORNIA MOUSE ACROSS FEMALES' REPRODUCTIVE CYCLE

IN MAMMALS, MATERNAL CARE IS ESSENTIAL FOR SURVIVAL AND DEVELOPMENT OF OFFSPRING. MATERNAL BEHAVIOR IS TYPICALLY ACTIVATED BY HORMONAL CHANGES DURING PREGNANCY, PARTURITION, AND LACTATION. FEMALES OFTEN BECOME HIGHLY ATTRACTED TO INFANTS AT THE END OF PREGNANCY, WHILE THE OPPOSITE MAY OCCUR DURING THE LACTATIONAL PERIOD. THEREFORE, IT IS NOT CLEAR HOW FEMALES RESPOND TO INFANTS IN SPECIES IN WHICH FEMALES GESTATE AND LACTATE CONCURRENTLY. MOREOVER, VERY LITTLE IS KNOWN ABOUT FATHERS' RESPONSES TO INFANTS ACROSS THEIR MATES' REPRODUCTIVE CYCLE. IN THIS STUDY, WE CHARACTERIZED PARENTAL BEHAVIOR OF MOTHERS AND FATHERS ACROSS THE REPRODUCTIVE CYCLE IN THE BIPARENTAL CALIFORNIA MOUSE (*PEROMYSCUS CALIFORNICUS*), IN WHICH FEMALES ARE USUALLY BOTH PREGNANT AND LACTATING. WE PREDICTED THAT MOTHERS WOULD BE LESS MATERNAL DURING THE LATE STAGES OF PREGNANCY, WHILE FATHERS' BEHAVIOR WOULD NOT CHANGE MARKEDLY. EACH PARENT WAS INTRODUCED TO A YOUNG, UNFAMILIAR PUP IN A TEST CAGE FOR 10 MINUTES AT FOUR DIFFERENT TIME POINTS OF PREGNANCY, AND ITS BEHAVIOR WAS VIDEO RECORDED. VIDEOS WERE SCORED FOR PUP-DIRECTED BEHAVIORS, AND BEHAVIOR WAS COMPARED ACROSS THE FOUR TIME POINTS FOR EACH SEX. PRELIMINARY DATA INDICATE THAT FEMALES ARE LESS LIKELY TO ENGAGE IN PARENTAL BEHAVIOR IN THE LATE STAGES OF PREGNANCY AND LACTATION THAN IN THE EARLY STAGES. HOWEVER, APPROXIMATELY 90% OF FATHERS BEHAVED PARENTALLY AT EACH TIME POINT. THESE RESULTS INDICATE THAT MOTHERS BECOME LESS NURTURANT TOWARD UNFAMILIAR PUPS AS THEIR OWN PUPS BECOME INDEPENDENT, EVEN DURING LATE PREGNANCY, WHEREAS FATHERS ARE HIGHLY NURTURANT TOWARD PUPS ACROSS THE FEMALE CYCLE.

KIMIA SHAMSIAN, BIOLOGY

FACULTY MENTOR(S): BRENT HUGHES

BLINDED BY THE BIAS: COMPUTATIONAL MECHANISMS UNDERLYING POLITICAL EVIDENCE ACCUMULATION.

HOW DO POLITICAL MOTIVATIONS BIAS EVIDENCE ACCUMULATION? PARTICIPANTS (N=149) WERE FINANCIALLY INCENTIVIZED TO PREDICT WHETHER A DEMOCRAT OR A REPUBLICAN POLITICIAN MADE MORE HONEST STATEMENTS. THE DEMOCRAT WAS MORE HONEST ON HALF OF THE ISSUES, WHILE THE REPUBLICAN WAS MORE HONEST ON THE OTHER HALF. MATCHING OUR HYPOTHESES, PREDICTIONS WERE MORE ACCURATE WHEN THE INGROUP WAS MORE HONEST (65%) COMPARED TO WHEN THE OUTGROUP WAS MORE HONEST (61%), ($B = -.17$, 95 % CIs = $[-.25, -.09]$, SE = $.04$, $z = -4.36$, $p < .0001$). MOREOVER, PARTICIPANTS REQUIRED LESS AND WEAKER EVIDENCE TO THAT THE INGROUP CANDIDATE WAS MORE HONEST COMPARED TO THE OUTGROUP ($B = .10$, 95 % CIs = $[.018, .186]$, SE = $.04$, $z = 2.40$, $p = .016$). NEXT, WE TESTED WHETHER COGNITIVE REASONING AND STRENGTH OF POLITICAL AFFILIATION MODERATED TASK PERFORMANCE. RESULTS INDICATED THAT PARTICIPANTS WITH HIGHER COGNITIVE REASONING, AND STRONGER POLITICAL CONVICTIONS MADE THE MOST ACCURATE CATEGORIZATIONS WHEN THE INGROUP WAS MORE HONEST ($B = -.13$, 95 % CIs = $[-.22, -.05]$, SE = $.05$, $z = -3.08$, $p = .001$). FINALLY, USING DRIFT-DIFFUSION MODELING, WE EXAMINED 3 COMPETING MECHANISMS UNDERLYING BIASED INFORMATION PROCESSING, INCLUDING (1) A BIAS IN PARTICIPANTS' STARTING POINT, OR AN A PRIORI PREFERENCE FOR THE INGROUP, (2) A BIAS IN DRIFT RATE, OR THE RATE THAT INGROUP INFORMATION IS FAVORED, AND (3) A BIAS IN BOTH PARAMETERS. THE BEST-FITTING MODEL CONTAINED BIASES IN STARTING POINT AND DRIFT RATE. IN SUMMARY, PARTISAN MOTIVATIONS BIAS NUMERICAL JUDGMENTS THAT FAVOR THE INGROUP.

THANIYA SHANKAR, BIOLOGY

FACULTY MENTOR(S): KATHERINE STAVROPOULOS

MEASURING CUTE AGGRESSION IN CHILDREN WITH AND WITHOUT AUTISM SPECTRUM DISORDER

AUTISM SPECTRUM DISORDER (ASD) IS A NEURODEVELOPMENTAL DISORDER CHARACTERIZED BY CHALLENGES IN SOCIAL COMMUNICATION AND THE PRESENCE OF RESTRICTED INTERESTS OR REPETITIVE BEHAVIORS (APA, 2022). ONE FACET OF SOCIAL-COMMUNICATION WHICH CAN BE CHALLENGING FOR AUTISTIC CHILDREN IS COGNITIVE EMPATHY – DESCRIBED AS BEING ABLE TO NOTICE ANOTHER INDIVIDUAL EXPRESSING EMOTIONS, INTERPRETING THOSE EMOTIONS CORRECTLY BASED ON THE INDIVIDUAL'S BEHAVIOR, AND RESONATING WITH THOSE FEELINGS (SMITH, 2017; FLETCHER-WATSON 2019). CUTE AGGRESSION (CA) IS THE DESIRE TO BITE, SQUEEZE, OR PINCH SOMETHING CUTE ALBEIT WITH NO DESIRE TO CAUSE HARM. THIS DESIRE TO NOT CAUSE HARM DESPITE URGES TO SQUEEZE SOMETHING MAY BE RELATED TO EMPATHY OR THEORY OF MIND. THAT IS, DESPITE THE DESIRE TO BITE, SQUEEZE, OR PINCH SOMETHING CUTE, INDIVIDUALS WHO EXPERIENCE CUTE AGGRESSION ARE CAREFUL NOT TO HARM THE INFANTILE OR CUTE THING (AND THUS DO NOT BITE, SQUEEZE, OR PINCH TOO HARD). A PREVIOUS STUDY IN YOUNG ADULTS FOUND THAT WHILE OBSERVING CUTE ANIMALS, BRAIN ACTIVATION INVOLVED THE REWARD AND EMOTION SYSTEMS AND WAS RELATED TO FEELINGS OF BEING OVERWHELMED AND CARETAKING (STAVROPOULOS & ALBA, 2018). HOWEVER, CA HAS NOT BEEN STUDIED IN NEUROTYPICAL OR AUTISTIC CHILDREN. THIS PROJECT PROPOSES TO INVESTIGATE A) WHETHER HAVING A HOUSEHOLD PET INCREASES THE LIKELIHOOD OF AUTISTIC CHILDREN EXPRESSING MORE CUTE AGGRESSION AND B) THE ASSOCIATION BETWEEN FEELINGS OF CUTE AGGRESSION AND EMPATHY IN AUTISTIC CHILDREN. FINDINGS FROM THIS STUDY WILL IMPROVE OUR UNDERSTANDING IN THE DEVELOPMENT OF CUTE AGGRESSION AND EMPATHY IN CHILDREN WITH AUTISM.

ARYA SHERAFAT, CELL, MOLECULAR, AND DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): BYRON FORD

DOES STROKE CAUSE ENDOGENOUS EXPANSION OF TRANSIENT OLIGODENDROCYTES?

STROKE IS THE FIFTH LEADING CAUSE OF DEATH AND THE LEADING CAUSE OF ADULT DISABILITY IN THE UNITED STATES. OUR LAB AND OTHERS HAVE SHOWN THAT EXOGENOUS NEUREGULIN-1 (NRG-1) DECREASES ACUTE NEURONAL DEATH AND NEUROINFLAMMATION AFTER ISCHEMIC INJURY. CLINICALLY, NRG-1 SHOWED SIGNIFICANT EFFICACY FOR IMPROVING CARDIAC FUNCTION IN PATIENTS WITH HEART FAILURE.

THROUGH OUR STUDIES, WE HOPE TO FURTHER CHARACTERIZE NEUROREGENERATION BY NRG-1 USING AN INNOVATIVE MOUSE MODEL OF ISCHEMIC STROKE. PHOTOTHROMBOSIS IS A MODEL WHICH TARGETS THE MIDDLE CEREBRAL ARTERY IN RODENTS, PRODUCES A FIXED THROMBUS, AND INITIATES A FOCUSED CORTICAL STROKE. THIS NON INVASIVE MODEL CREATES AN IDEAL BASIS FOR STROKE STUDIES THROUGH ITS MINIMALLY INVASIVE MEANS AND IN VIVO DESIGN.

OLIGODENDROCYTES PLAY AN IMPORTANT ROLE IN TRAUMATIC BRAIN INJURY REGENERATION AS THEIR MYELINATION AROUND NEURONS ARE CHARACTERISTIC FOR IMPORTANT NEURONAL PROCESSES. OLIGODENDROCYTES HAVE BEEN STUDIED EXTENSIVELY IN MULTIPLE SCLEROSIS MODELS BUT NOT YET CHARACTERIZED IN A PHOTOTHROMBOTIC STROKE MODEL. IN STUDYING OLIGODENDROCYTES WE CAN BETTER UNDERSTAND THE REGENERATIVE PROCESSES THAT MIGHT OCCUR AFTER STROKE.

OUR RESEARCH QUESTION LOOKS SPECIFICALLY AT A TRANSIENT POPULATION OF OLIGODENDROCYTES WHICH ARE DIFFERENTIATED BY BCAS POSITIVITY THROUGH HISTOLOGY. WE ANTICIPATE THAT THERE WILL BE A GREATER AMOUNT OF BCAS POSITIVE CELLS AFTER PHOTOTHROMBOTIC STROKE. IN CHARACTERIZING THE PROLIFERATION OF THESE TRANSIENT OLIGODENDROCYTES BEFORE AND AFTER STROKE INJURY WE CAN UNDERSTAND WHERE PROLIFERATION OCCURS.

UNDERSTANDING THE EXPANSION OF THESE TRANSIENT POPULATIONS OF OLIGODENDROCYTES WILL SERVE AS THE BASIS TO UNDERSTAND THE ROLE THAT NRG-1 MIGHT PLAY IN REGENERATION AND OLIGODENDROCYTE MATURATION.

MIKU SHIMONO, BIOCHEMISTRY

FACULTY MENTOR(S): TIMOTHY SU

ELUCIDATING THE MECHANISTIC PATHWAY OF SILA-ADAMANTANE ISOMERIZATION USING MONOHYDRIDE PRECURSORS

SILA-ADAMANTANE IS THE FUNDAMENTAL SILICON DIAMONDROID CLUSTER THAT SHARES THE SAME CORE STRUCTURE AS THE UNIT CELL OF CRYSTALLINE SILICON, THE SEMICONDUCTOR MATERIAL AT THE HEART OF COMPUTER CHIPS AND SOLAR CELLS. IT THUS REPRESENTS THE ULTIMATE LIMIT OF MINIATURIZATION FOR NANOSCALE SILICON ELECTRONICS. THE SYNTHESIS OF SILA-ADAMANTANE WAS DISCLOSED BY MARSCHNER AND COWORKERS IN 2005, WHO EMPLOYED ALUMINUM CHLORIDE AS A LEWIS ACID TO ISOMERIZE A STRAINED, TRICYCLIC OLIGOSILANE TO ITS LOWEST ENERGY SILA-DIAMONDROID ISOMER. SINCE THIS REPORT, NO EXPERIMENTAL REPORTS HAVE FOLLOWED UP ON THE MECHANISM OF THIS INTRIGUING REARRANGEMENT. RECENTLY, MY COWORKERS AND I HAVE FOUND INDIRECT EXPERIMENTAL SUPPORT THAT AN ALUMINATE-STABILIZED SILYLIUM ION IS GENERATED AT THE 2-POSITION OF SILA-ADAMANTANE AS THE FINAL INTERMEDIATE IN ITS ISOMERIZATION. THIS POSTER BUILDS OFF THIS PRELIMINARY RESULT AND EXPLORES SYNTHETIC STRATEGIES TO EXPLORE THIS ISOMERIZATION MECHANISM IN GREATER DETAIL. OUR INVESTIGATION BEGINS WITH THE INSTALLATION OF A SILYL HYDRIDE FUNCTIONAL GROUP AT PRIMARY, SECONDARY, AND TERTIARY SILICON CENTERS WITHIN THE TRICYCLIC PRECURSOR. TREATMENT WITH A TRITYL TETRAARYLBORATE CATALYST INITIATES HYDRIDE TRANSFER FROM THE PRECURSOR, GENERATING SILYLIUM-LIKE IONS AT SITE-SELECTIVE LOCATIONS. THE ISOMERIZATION WILL THEN BE MONITORED OVER THE REACTION TIME COURSE USING LOW-TEMPERATURE ^{29}Si NMR TO SURVEY THE INTERMEDIATES THAT MAY CONVERGE TO SILA-ADAMANTYL STRUCTURES. THESE STUDIES WILL ALLOW US TO UNDERSTAND HOW THE SITE OF INITIAL SILYLIUM ION FORMATION IMPACTS THE COMPETENCY OF ISOMERIZATION AND DISENTANGLE THE KEY PARAMETERS THAT UNDERPIN THE REARRANGEMENT MECHANISM. ULTIMATELY THESE FINDINGS WILL INFORM THE LARGE-SCALE DESIGN AND SYNTHESIS OF SILICON DIAMONDROID-BASED NANOELECTRONICS.

EVAN SHIMOTA, BIOLOGY

FACULTY MENTOR(S): ALAN BRELSFORD

GENETICS OF SOCIAL STRUCTURE AND SEX RATIO IN THE ANT *FORMICA EXSECTA*

MANY ANT SPECIES DISPLAY BIASED SEX RATIOS IN THEIR COLONIES. PREVIOUS RESEARCH DETERMINED THAT THESE UNBALANCED SEX RATIOS WERE, IN PART, DUE TO RELATEDNESS ASYMMETRIES OBSERVED WITHIN COLONIES. SPECIFICALLY, IN *F. EXSECTA*, ECOLOGICAL FACTORS WERE FOUND TO CONTRIBUTE TO COLONY SEX RATIOS. IN ADDITION TO THIS, MANY ANT SPECIES FROM THE *FORMICA* GENUS, INCLUDING *F. GLACIALIS*, *F. SELYSI* AND *F. EXSECTA*, POSSESS TWO LARGE NON-RECOMBINING HAPLOTYPES ASSOCIATED WITH COLONY QUEEN NUMBER. OUR STUDY WILL ASSESS THE GENETIC BASIS OF COLONY SEX RATIOS IN *F. EXSECTA*, TO UNDERSTAND WHETHER THERE ARE GENETIC CONTRIBUTIONS TO BIASED SEX RATIO AND QUEEN NUMBER VARIATION IN *F. EXSECTA* AND HOW THIS COMPARES TO OTHER *FORMICA* SPECIES. I PERFORMED DNA EXTRACTIONS ON 850 WORKERS AND SEXUALS FROM 106 *F. EXSECTA* COLONIES. OF THESE 106 COLONIES, 19 WERE MALE PRODUCING, 34 WERE FEMALE PRODUCING AND 17 PRODUCED BOTH MALES AND FEMALES. WE PREPARED DDRADSEQ GENOMIC LIBRARIES WHOSE DATA I WILL UTILIZE TO DETECT IF COLONY SEX-RATIO PHENOTYPE IS CORRELATED WITH COLONY QUEEN NUMBER. THEN I WILL ASSESS WHETHER ANY GENETIC MARKERS ARE CORRELATED WITH EITHER, OR BOTH, COLONY SEX RATIO AND COLONY QUEEN NUMBER.

JIERA SIRIVATANARAT, NEUROSCIENCE

FACULTY MENTOR(S): JOHN FRANCHAK

DOES LEARNING TO WALK INCREASE POSTURE SYNCHRONIZATION BETWEEN INFANTS AND CAREGIVERS?

INFANTS AND THEIR CAREGIVERS SPEND MUCH OF THEIR TIME INTERACTING AND PLAYING WITH EACH OTHER IN CLOSE PROXIMITY. AN INFANT DOES NOT STAY IN THE SAME POSTURE THROUGHOUT THE ENTIRE DAY, ESPECIALLY WHEN THEY CAN WALK WHICH RESULTS IN MORE MOTOR FREEDOM. THIS INCREASED MOBILITY MAY RESULT IN CAREGIVERS MATCHING THE POSTURE OF THE INFANT WHILE PLAYING WITH THEM. LEARNING TO WALK MAY ALSO CHANGE EMOTIONAL RELATIONS WITH THE CAREGIVER BECAUSE THEIR FACES ARE CLOSER TO EACH OTHER. A PAST STUDY FOUND THAT IN A LAB SETTING, INFANT POSTURE AND CAREGIVER POSTURE WERE SYNCHRONIZED WITH EACH OTHER DURING PLAY. FOR EXAMPLE, CAREGIVERS WERE MORE LIKELY TO BE UPRIGHT WHEN THE INFANT WAS UPRIGHT. IN THE CURRENT STUDY, WE ARE TESTING INFANT-CAREGIVER POSTURE SYNCHRONIZATION IN A HOME SETTING AS OPPOSED TO THE LAB ENVIRONMENT BECAUSE THE HOME ENVIRONMENT WILL REFLECT MORE NATURALISTIC ACTIONS.

USING INERTIAL SENSORS WORN BY INFANTS AND CAREGIVERS, POSTURE WILL BE CALCULATED THROUGHOUT THE DAY USING MACHINE LEARNING CLASSIFICATION TO INFER THE POSITION FROM SENSOR DATA. POSTURES WILL ALSO BE CODED BY VIDEO TO CHECK THE ACCURACY OF THE SENSOR CLASSIFICATION. INFANTS AGES 11 TO 14 MONTHS OLD ARE TESTED BECAUSE THAT IS THE AGE RANGE WHEN INFANTS TYPICALLY LEARN TO WALK. THE CALCULATED PERCENTAGE OF MATCHING POSTURE WILL SHOW WHETHER LEARNING TO WALK RESULTS IN DIFFERENCES IN INFANT-CAREGIVER SYNCHRONY. I PREDICT THAT CAREGIVERS MORE OFTEN SYNCHRONIZE WITH WALKING INFANTS.

CHRISTINE TANG, BIOCHEMISTRY

FACULTY MENTOR(S): MICHAEL PIRRUNG

SYNTHESIS OF 6PPD-QUINONE THROUGH THE OXIDATION OF DIAMINE HYDROQUINONE

6PPD-QUINONE IS A TOXIC CHEMICAL TO COHO SALMON (*ONCORHYNCHUS KISUTCH*). THE TOXIN COMES FROM THE OXIDATION OF THE PRESERVATIVE 6PPD IN RUBBER TIRES THAT OCCURS OVER TIME. IT HAS NOT BEEN FURTHER INVESTIGATED FOR OTHER HARMFUL BIOCHEMICAL PROPERTIES TO OTHER LIVING ORGANISMS. PRODUCING, IN QUANTITY, 6PPD-QUINONE WILL GIVE RESEARCH MATERIAL TO FURTHER ANALYZE THE POSSIBLE ENVIRONMENTAL AND BIOCHEMICAL EFFECTS THIS COMPOUND HAS ON OTHER FISH AND WILDLIFE POPULACE. IN ORDER TO CREATE THIS PRODUCT, THREE MAIN REACTIONS ARE USED ALONGSIDE MULTIPLE PURIFICATION PROCESSES AND QUALITATIVE AND QUANTITATIVE ANALYSIS OF INTERMEDIATE PRODUCTS. IN AN ARTICLE AUTHORED BY AGUA, STANTON, AND PIRRUNG, A KEY STEP IN THE REACTION PROVED INCONSISTENT IN TERMS OF YIELD AND HAD NOT BEEN RUN ON A LARGE SCALE. THE REACTION WAS OPTIMIZED THROUGH MULTIPLE TRIALS OF VARIED RUN TIMES AND CONDITIONS, WHICH ALLOWED THE REACTION TO BE RUN ON A LARGER SCALE AND EFFICIENTLY USE STARTING MATERIAL.

ISAIAH TORRES, BIOLOGY

FACULTY MENTOR(S): CHRISTOPHER CLARK

DETERMINING THE HEARING RANGE OF HUMMINGBIRDS

HUMMINGBIRDS ARE ONE OF FEW CREATURES THAT USE INCREDIBLY HIGH FREQUENCY SOUNDS TO COMMUNICATE WITH EACH OTHER. HOWEVER, BIOLOGISTS WONDER WHETHER HUMMINGBIRDS CAN HEAR SUCH UNIQUE SOUNDS. USING A FEMALE COSTA HUMMINGBIRD, AN EXPERIMENT OF 3 LOCATIONS (EACH WITH A SPEAKER AND FEEDER ATTACHED) WERE USED TO PERMIT THE MOVEMENT OF A SOUND SOURCE THROUGHOUT A SERIES OF TRIALS. THE PROCEDURE WAS TO RECORD WHETHER THE HUMMINGBIRD COULD MAKE THE ASSOCIATION AND HAVE A HIGHER SUCCESS RATE WHEN FINDING THE FOOD. USING 4 DIFFERENT FREQUENCIES (200 Hz, 4 kHz, 10 kHz, 14 kHz) AT 33 TRIALS

EACH, THE RESULTS WERE ALL GREATER THAN THE BASELINE SUCCESS RATE OF 11 FOR 33. AFTER ANALYZING THE TRIALS USING A CHI SQUARED TEST, EACH OF THE FREQUENCY BLOCKS OBTAINED SIGNIFICANT RESULTS. NOW THAT THIS PAPER HAS GIVEN SOME INSIGHT ON THE HEARING RANGE OF HUMMINGBIRDS, FUTURE RESEARCHERS CAN APPLY THIS EXPERIMENT TO EVEN LOWER AND/OR HIGHER SOUNDS AND DISCOVER WHETHER HUMMINGBIRDS CAN IDENTIFY AND RESPOND ACCORDINGLY TO THE SOUND.

SIUDY TORRES, BIOLOGY

FACULTY MENTOR(S): IVAN AGUIRRE

EL SUEÑO CHICANO

MY CAPSTONE PROJECT WILL BE STUDYING THE CHICANO/A YOUTH IN ADDITION TO HOW THEY HAVE CHANGED IN THEIR COMMUNITIES AND CHANGED THE CHICANO/A COMMUNITY. THE RESEARCH WILL FOCUS ON SOUTHERN CALIFORNIA CHICANO/AS. THE PROJECT WILL LOOK AT CULTURAL ASPECTS TO SEE HOW IT HAS SHAPED THE CHICANO COMMUNITY FROM 30-40 YEARS AGO, FROM THE LATE 1970S TILL NOW. THIS WILL BE SEEN THROUGH MUSIC AND FILM PRODUCED IN THE COMMUNITIES, AND MUSIC AND FILM PORTRAYING YOUTH IN THEIR COMMUNITIES, AND CLOSE ATTENTION WILL BE PAID TO ANY SIMILARITIES AND/OR DIFFERENCES THAT HAVE ARISEN IN THE COMMUNITIES WITHIN EACH GENERATION. THE PROJECT WOULD DIVE INTO THREE THEMES OF SOLIDARITY, INTERSECTIONALITY, AND THE FIGHT FOR EQUALITY. IN EACH THEME, WE WOULD LOOK INTO DIFFERENT SOCIAL CONSTRUCTS OF FILM AND MUSIC, AND SEE HOW THOSE THEMES WERE PORTRAYED IN THEM. WITHIN THOSE SOCIAL CONSTRUCT EXAMPLES, I WOULD DIVE INTO THE INFLUENCE IT HAD ON CHICANOS AND SEE THE EFFECT IT HAD WITHIN GENERATIONS. MY RESEARCH HYPOTHESIS IS THAT THIS 30-40 YEAR TIME PERIOD WILL SHOW SIGNIFICANT GROWTH IN DISCARDING THEIR OLD VIEWS TIED TO PATRIARCHAL AND COLONIAL CULTURAL NORMS, AND FORMING THEIR NEW VIEWS IN HOW THEY SEE THEMSELVES AS A COMMUNITY, FURTHER IMPACTING HOW THEY SEE THE WORLD. I ALSO THINK THESE CHANGES WILL BE ABLE TO BE SEEN THROUGH THE CULTURAL ASPECTS OF MUSIC AND FILM BECAUSE EACH SONG AND FILM THAT COMES OUT TENDS TO GIVE A GLIMPSE INTO HOW LIFE IS FOR CONTEMPORARY CHICANO/AS.

ASHLEY TRINIDAD, NEUROSCIENCE

FACULTY MENTOR(S): WILLIAM PORTER

INDOOR AIR QUALITY IN THE COACHELLA VALLEY

THE COACHELLA VALLEY IS AN ARID, DUSTY REGION AT THE NORTH END OF CALIFORNIA'S SALTON SEA, AND IS HIGHLY IMPACTED BY ITS PROXIMITY TO SANDY DUNES, THE DRYING SALTON SEA LAKEBED, AND OTHER DESERT AREAS. SOURCES OF DUST SUCH AS THESE LEAD TO HIGH CONCENTRATIONS OF PARTICULATE MATTER (PM), A CATEGORY OF CRITERIA POLLUTANT KNOWN TO CAUSE NEGATIVE HEALTH OUTCOMES. WHILE PATTERNS OF AMBIENT AIR QUALITY IN THE REGION HAVE BEEN STUDIED FOR SOME TIME, THUS FAR THERE IS LIMITED RESEARCH ON AIR QUALITY WITHIN COACHELLA VALLEY HOMES AND HOW IT IS INFLUENCED BY OUTDOOR CONDITIONS. HERE WE ANALYZE PATTERNS, DRIVERS, AND CORRELATIONS BETWEEN AMBIENT AND INDOOR PARTICULATE MATTER CONCENTRATIONS TO EXPLORE THE DAILY AND SEASONAL CYCLE OF INDOOR AIR QUALITY IN THE REGION AND BETTER UNDERSTAND THE WAYS IN WHICH THESE CYCLES ARE INFLUENCED BY OUTDOOR CONDITIONS SUCH AS WINDBLOWN DUST EVENTS. WE ANALYZE PARTICULATE MATTER (PM1.0, PM2.5, AND PM10) USING AIR QUALITY MONITORS PLACED WITHIN SIXTEEN HOMES OF VOLUNTEER PARTICIPANTS IN THE COACHELLA VALLEY. USING THESE MONITORS ALONG WITH EXISTING OUTDOOR STATION MEASUREMENTS, WE EXPLORE CONNECTIONS BETWEEN THE INDOOR AND OUTDOOR REGIMES, QUANTIFY OBSERVED VARIABILITY AND SIMILARITIES BETWEEN PARTICIPANT HOMES, AND ASSESS THE IMPACT OF OUTDOOR CONDITIONS ON INDOOR PATTERNS AND HEALTH IMPACTS.

WILLIAM TROXEL, BIOCHEMISTRY

FACULTY MENTOR(S): CHIA-EN CHANG

EXPLORING IMATINIB'S AFFINITIES AND SPECIFICITIES FOR TYROSINE KINASES USING MOLECULAR DYNAMICS SIMULATIONS

COMPUTATIONAL PROTEOMICS LETS US MODEL DRUG-PROTEIN INTERACTIONS IN WAYS CONVENTIONAL ASSAYS CANNOT. MOST DRUGS TARGET ONE PROTEIN, BUT SOME INTERACT WITH MULTIPLE PROTEINS. IMATINIB INHIBITS ABL TO TREAT CHRONIC MYELOID LEUKEMIA. PROTEIN ASSAYS SHOW IT INHIBITS OTHER KINASES TO TREAT OTHER MALIGNANCIES, BUT THE ATOMISTIC MECHANISMS ARE POORLY UNDERSTOOD. ALTHOUGH COMPLEX STRUCTURES ARE AVAILABLE, BINDING DYNAMICS AND PROTEIN FUNCTIONS ARE NOT SEEN. IMATINIB HAS DIFFERENTIAL KINASE AFFINITIES, ABL AND SRC SHARE 50% SIMILARITY, BUT A 3000X AFFINITY DIFFERENCE. IN CONTRAST, ABL AND KIT HAVE STRONG IMATINIB AFFINITIES DESPITE SHARING 30% SIMILARITY. MY OBJECTIVES ARE TO MODEL FREE PROTEIN AND IMATINIB BOUND STATES FOR ABL, KIT, AND SRC KINASES USING 100 NS MOLECULAR DYNAMICS (MD) SIMULATIONS TO SURVEY THE COMPLEX INTERACTIONS AND PROTEIN CONFORMATIONAL DYNAMICS OVER TIME. ROOT-MEAN-SQUARE-DEVIATION AND FLUCTUATION (RMSD AND RMSF) ANALYSES SHOW THE SYSTEMS EQUILIBRATE BY 40 NS, BUT THE FLEXIBLE REGIONS DIFFER FOR THE THREE SYSTEMS. THIS HAS IMPLICATIONS FOR KINASE ACTIVITY, AS PROTEINS NEED TO BE FLEXIBLE TO FOLD INTO THE CORRECT CONFORMATIONS FOR SIGNALING PATHWAYS. SALT BRIDGES FORM IN THE ABL COMPLEX AND BREAK IN THE KIT COMPLEX. ABL HAS ONE HYDROGEN BOND (H-BOND) BETWEEN MET84 AND IMATINIB FOR 20.4 NS. KIT HAS THREE H-BONDS WITH IMATINIB, ONE BETWEEN CYS109 FOR 16.8 NS AND BOTH OXYGENS OF GLU76 FOR 11.4 NS. SRC HAS NO MAJOR H-BONDS WITH IMATINIB. THESE FINDINGS DEMONSTRATE THAT IMATINIB'S MULTI-KINASE PROMISCUITY CANNOT SOLELY BE EXPLAINED BY GENERAL PROTEIN HOMOLOGY AND REQUIRES A MORE NUANCED ANALYSIS OF NON-COVALENT INTERACTIONS.

ALEXANDRA VACARU, APPLIED MATHEMATICS CONCENTRATION IN CHEMISTRY

FACULTY MENTOR(S): JULIA BAILEY-SERRES

EXPLORING NEW STRATEGIES FOR ENGINEERING CLIMATE CHANGE RESILIENT RICE

RICE IS A GLOBALLY IMPORTANT STAPLE CROP FOR HALF THE WORLD'S POPULATION. FLOODING AND ITS ATTENDANT REDUCTION IN GROWTH AND REPRODUCTION IS AN ANNUAL THREAT, AFFECTING MORE THAN 135 MILLION HECTARES OF RAINFED LOWLAND FIELDS WHICH SUPPORT APPROXIMATELY 19% OF THE WORLD'S RICE PRODUCTION. NEW STRATEGIES FOR RESILIENCE ARE NEEDED TO ADDRESS THIS THREAT. WE HYPOTHEZIZE THAT MOVEMENT OF CARBOHYDRATES AND AMINO ACIDS FROM LEAF TISSUE TO THE SHOOT MERISTEM IS ESSENTIAL FOR THE SURVIVAL OF RICE PLANTS AND THEIR RECOVERY FROM SUBMERGENCE STRESS. SHOOT MERISTEMS ORGANIZE THE STEM CELL NICHE, DETERMINING THE INITIATION AND DEVELOPMENT OF LEAVES AND EVENTUALLY FLORAL ORGANS. TO TEST THIS HYPOTHESIS, THE BAILEY-SERRES TEAM GENERATED MUTANTS OF GENES THAT ARE ACTIVATED IN SHOOT MERISTEMS UNDER SUBMERGENCE, FOCUSING ON CARBOHYDRATE TRANSPORTERS THAT MOVE FIXED SUGARS FROM LEAVES TO NON-PHOTOSYNTHETIC TISSUES, SUCH AS SHOOT MERISTEMS AND ROOTS. I AM MONITORING PHENOTYPES AND CARBOHYDRATES IN THESE REGIONS IN GERMINATING SEEDLINGS AND YOUNG PLANTS. I OBSERVE SIGNIFICANTLY COMPROMISED GERMINATION IN CARBOHYDRATE TRANSPORTER GENE KNOCK-OUT MUTANTS, WHEREAS LINES ENGINEERED TO HAVE INCREASED TRANSPORTER GENE EXPRESSION DISPLAY INCREASED ROOT GROWTH. NON-RADIOACTIVE ISOTOPE CARBON-13 (¹³C) TRACING IS BEING USED TO TRACK DYNAMICS IN THE MOVEMENT OF SUGARS FROM LEAVES TO THE SHOOT MERISTEM REGION AND SUBSEQUENT METABOLIC ACTIVITY IN RESPONSES TO SUBMERGENCE. DATA OBTAINED THUS FAR INDICATE THAT TARGETED MANIPULATION OF SPECIFIC CARBOHYDRATE TRANSPORTERS INFLUENCES GROWTH UNDER CONTROL AND SUBMERGENCE CONDITIONS. THESE FINDINGS PROVIDE A POTENTIAL PATH TO IMPROVEMENT OF YIELD OF RICE AND OTHER CROPS IN A CHANGING GLOBAL CLIMATE.

ABEL VARGAS, BIOCHEMISTRY, GENETICS, GENOMICS, AND BIOINFORMATICS

FACULTY MENTOR(S): KATHERINE BORKOVICH

DIFFERENTIAL EFFECTS OF G-PROTEIN SUBUNITS ON MULTIPLE CELLULASE ENZYMES IN *NEUROSPORA CRASSA*

FUNGI USE HETEROTRIMERIC G-PROTEIN SIGNALING TO SENSE AND RESPOND TO ENVIRONMENTAL SOURCES OF CARBON. PRODUCTION OF CELLULASES OCCURS IN THE PRESENCE OF CELLULOSE AND THE ABSENCE OF A PREFERRED CARBON SOURCE, SUCH AS GLUCOSE. *NEUROSPORA CRASSA* SECRETES MULTIPLE CLASSES OF CELLULASES TO FULLY DEGRADE CELLULOSE INTO GLUCOSE, INCLUDING BETA-GLUCOSIDASES, ENDOGLUCANASES, AND CELLOBIOHYDROLASES. THESE DIFFERENT CLASSES OF CELLULASES ACT ON DIFFERENT PARTS OF THE CELLULOSE CHAIN, AND THERE ARE MULTIPLE ENZYMES BELONGING TO EACH CLASS. PREVIOUS RESEARCH CONDUCTED ON *N. CRASSA* HAS IMPLICATED HETEROTRIMERIC G-PROTEIN SUBUNITS IN PRODUCTION OF THE ENZYMES REQUIRED FOR CELLULOSE TO BE METABOLIZED ALL THE WAY TO GLUCOSE (GLUCOSE RELEASE ACTIVITY). IN PARTICULAR, LOSS OF THE GALPHA SUBUNIT GENES *GNA-1* OR *GNA-3* LEADS TO LOSS OF DETECTABLE GLUCOSE RELEASE CELLULASE ACTIVITY AFTER GLUCOSE-GROWN CULTURES ARE TRANSFERRED TO CELLULOSE-CONTAINING MEDIUM. GIVEN THAT *N. CRASSA* PRODUCES MULTIPLE CELLULASES, WE FURTHERMORE WANTED TO TEST THE EFFECTS OF G PROTEIN MUTATIONS ON THE DIFFERENT CLASSES OF CELLULASES, AS WELL AS POSSIBLE EPISTATIC RELATIONSHIPS BETWEEN THE SUBUNITS DURING REGULATION OF THESE ENZYMES. RESULTS FROM THE ENDOGLUCANASE, CELLOBIOHYDROLASE, AND BETA-GLUCOSIDASE ASSAYS SHOWED THAT MUTANTS LACKING *GNA-3*, *GNB-1*, OR *GNG-1*, EXHIBITED REDUCED ACTIVITY OF ALL THREE CLASSES OF CELLULASES SECRETED BY *N. CRASSA*. ADDITIONALLY, WHILE THE *GNA-1* GENE-DELETION MUTANT SHOWED LOWER ACTIVITY FOR CELLOBIOHYDROLASES AND BETA-GLUCOSIDASES, THE MUTANT POSSESSED ENDOGLUCANASE ACTIVITY THAT WAS HIGHER THAN THAT OF THE WILD-TYPE STRAIN.

EMILY VILLALPANDO, BIOCHEMISTRY

FACULTY MENTOR(S): ERNEST MARTINEZ

THE ROLE OF MYC ACETYLATION ON BREAST CANCER

OVEREXPRESSION OF THE MYC PROTO-ONCOGENE HAS BEEN OBSERVED IN >70% OF HUMAN CANCERS AND IS ASSOCIATED WITH AGGRESSIVE TUMORIGENESIS AND A POOR PROGNOSIS. MYC IS A TRANSCRIPTION FACTOR INVOLVED IN SEVERAL CELLULAR PROCESSES, SUCH AS CELL GROWTH, DIFFERENTIATION, PROLIFERATION, APOPTOSIS, AND GENE EXPRESSION. IN PHYSIOLOGICAL CONDITIONS, MYC IS HEAVILY REGULATED THROUGH VARIOUS MECHANISMS, SUCH AS A SHORT HALF-LIFE AND POSTTRANSLATIONAL MODIFICATIONS (PTMs). IN CANCER CELLS, THE DEREGLATION OF MYC LEADS TO MALIGNANT TRANSFORMATION, BUT THE EXACT PATHWAYS ARE YET TO BE COMPLETELY UNDERSTOOD. WE POSTULATE THAT THE RELIANCE OF MYC-DRIVEN CANCERS ON PTMs, SUCH AS ACETYLATION OF SPECIFIC LYSINE RESIDUES, CONTRIBUTES TO THE DEREGLATION AND OVEREXPRESSION OF MYC IN HUMAN BREAST CANCER. THIS CAPSTONE PROJECT INCLUDES A DISCUSSION OF THE CURRENT STATE OF KNOWLEDGE IN THE FIELD IN REGARDS TO THE ROLE OF MYC IN PHYSIOLOGICAL AND ONCOGENIC CONDITIONS. ADDITIONALLY, I WILL DISCUSS PRELIMINARY CELL CULTURE AND WESTERN BLOT RESULTS THAT AIM TO ANALYZE THE ROLE OF MYC ACETYLATION IN TRANSFORMED HUMAN MAMMARY EPITHELIAL CELLS (MCF10A). THE LABORATORY DEVELOPED CELL LINES WITH LYSINE TO ARGININE MUTATIONS (K149R, K158R, K323R) TO INHIBIT LYSINE ACETYLATION AND DETERMINE THE EFFECTS OF SITE-SPECIFIC INHIBITION OF LYSINE ACETYLATION. THESE RESULTS WILL DETERMINE THE EFFECTS OF THESE MUTATIONS ON MYC PROTEIN STABILITY, EXPRESSION, AND MIGRATION OF MCF10A CELLS. DEMONSTRATING THE ROLE OF LYSINE ACETYLATION ON MYC TRANSFORMING ACTIVITY IN HUMAN CELLS WILL PROVIDE THE BASIS FOR FUTURE ANALYSIS OF THE ONCOGENIC FUNCTIONS OF MYC AND POTENTIAL CLINICAL VALUE OF SPECIFIC MYC TARGETS FOR CANCER THERAPIES.

JOSHUA WANG, NEUROSCIENCE

FACULTY MENTOR(S): MANUELA MARTINS-GREEN

CATALASE AND THE TREATMENT OF METASTATIC CASTRATION RESISTANT PROSTATE CANCER

PROSTATE CANCER (PC) REMAINS THE SECOND LEADING CAUSE OF CANCER DEATH IN THE USA AMONG MALES. DURING EARLY STAGES, PC IS SENSITIVE TO HORMONAL ABLATION THERAPY, OR ANDROGEN DEPRIVATION THERAPY (ADT). THIS INHIBITS MECHANISMS IN THE ANDROGEN SYNTHESIS PATHWAY, AND SUBSEQUENTLY SLOWS PROLIFERATION OF PC CELLS TO ALLOW FOR OTHER ADJUVANT THERAPIES (SURGERY, RADIATION, CHEMOTHERAPY) TO TAKE PLACE. WHILE SUCCESSFUL AT EARLY STAGES, RELAPSE OF CANCER FREQUENTLY OCCURS AND DEVELOPS ADT RESISTANCE: BECOMING THE AGGRESSIVE AND LETHAL CASTRATION RESISTANT PROSTATE CANCER (CRPC). AT THIS POINT, THERE EXISTS NO RELIABLE CURE AND PROGRESSION OF METASTATIC DISEASE LEADS TO DEATH. RECENTLY, ADT WAS LINKED TO GENERATING ELEVATED LEVELS OXIDATIVE STRESS (OS), WHICH HAS PREVIOUSLY BEEN SHOWN TO CAUSE INTRACELLULAR DAMAGE, INCREASE IN DNA MUTATIONS, AND ULTIMATELY CELL DEATH. AS SUCH, MY TARGET OF INTEREST HAS BEEN THE ANTIOXIDANT ENZYME CATALASE. CATALASE REDUCES OS BY CATALYZING THE DECOMPOSITION OF H₂O₂ (A TOXIC AGENT) TO WATER AND OXYGEN --- IMPROVING CANCER CELL SURVIVAL. I HYPOTHEZIZE THAT, IF WE REMOVE CATALASE AND TREAT WITH A STANDARD ADT DRUG (ABIRATERONE ACETATE), THIS COMBINATION SHOULD BE SIGNIFICANTLY MORE EFFECTIVE IN KILLING CANCER CELLS. I COMPARED THE EFFECTS OF AA TREATMENT ON OUR CATALASE-DEFICIENT PC CELL LINE IN VITRO WITH THAT OF THE WILDTYPE PC CELL LINE. I SHOW THAT AA TREATMENT LED TO SIGNIFICANTLY HIGHER LEVELS OF CELL DEATH IN WILDTYPE CELLS COMPARED TO CATALASE-DEFICIENT CELLS, INDICATING REDUCED EFFECTIVENESS OF AA WITH DECREASED CATALASE FUNCTION. WE ARE INVESTIGATING HOW CATALASE FUNCTION AFFECTS AA TREATMENT.

MEGAN WOODS, CHEMISTRY

FACULTY MENTOR(S): YING-HSUAN LIN, ROYA BAHREINI

IN-SILICO INVESTIGATION OF ELECTRON IONIZATION MASS SPECTRA OF NITRO-HETEROCYCLIC CHROMOPHORES IN BROWN CARBON AEROSOLS

BROWN CARBON (BRC) AEROSOL'S ABILITY TO ABSORB SOLAR RADIATION HAS EMERGED AS A COMPELLING FACTOR IN CLIMATE FORCING. HETEROCYCLES ARE ABUNDANT COMPONENTS IN ATMOSPHERIC AEROSOLS, HOWEVER, MUCH OF THEIR OPTICAL PROPERTIES REMAIN UNCLEAR. THESE UNCERTAINTIES STEM FROM AN INCOMPLETE CHARACTERIZATION OF BRC CHROMOPHORES STRUCTURES AND LACK OF AUTHENTIC STANDARDS TO CONFIRM LIGHT ABSORBING AEROSOL CONSTITUENTS. MASS SPECTROMETRY-BASED ANALYTICAL MEASUREMENTS HAVE BEEN WIDELY USED TO SPECIATE BRC AEROSOL CONSTITUENTS. NEVERTHELESS, DUE TO THE LARGE VARIETY AND CHEMICAL COMPLEXITY OF BRC AEROSOLS, THERE IS A LACK OF AUTHENTIC STANDARDS READILY AVAILABLE TO AID IN THE IDENTIFICATION OF THESE COMPOUNDS. UTILIZING QUANTUM CHEMICAL ELECTRON IONIZATION MASS SPECTRA (QCEIMS) TO SIMULATE A THEORETICAL EI MASS SPECTRUM MAY FACILITATE OVERCOMING THIS BARRIER. IN THIS STUDY, WE EXAMINED THE PERFORMANCE OF VARYING DENSITY FUNCTIONAL THEORY (DFT) COMPUTATIONAL METHODS AS WELL AS THE NEW STANDALONE XTB-2 METHOD IN QCEIMS TO DETERMINE A METHOD OF HIGH ACCURACY AND COMPUTATIONAL EFFICIENCY. WE ASSESSED THE PERFORMANCE OF THESE COMPUTATIONAL METHODS ON NITRO-HETEROCYCLIC COMPOUNDS 2-NITROFURAN, 2-NITROTHIOPENE, AND 2-NITROPYRROLE. TO DETERMINE THE ACCURACY OF THE COMPUTATIONAL CHEMISTRY FUNCTIONAL METHODS WAS EVALUATED USING STEIN/SCOTT MATCHING METHOD TO COMPARE THE THEORETICAL SPECTRA TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) EI STANDARDS. IN THIS WORK, WE INVESTIGATED THE PERFORMANCES OF GRADUAL GRADIENT APPROXIMATION (GGA) DFT METHODS PBE, B97D, BLYP, AND THE XTB-2 METHOD ON THE BROWN CHROMOPHORES. WITH DETAILED CHARACTERIZATION OF BRC CONSTITUENTS OBTAINED FROM QCEIMS, AND GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS), THIS TECHNIQUE MAY BE USED TO DEVELOP COMPREHENSIVE SOURCE PROFILES OF COMPLEX AEROSOLS.

MELODY WU, BIOLOGY

FACULTY MENTOR(S): KEVIN KOU

EXPANDING THE SCOPE OF CATALYTIC CARBON-HYDROGEN FUNCTIONALIZATION: SYNTHESIS OF MEDICINALLY-RELEVANT HETEROCYCLES

HETEROCYCLES, CYCLIC ORGANIC MOLECULES THAT CONTAIN NITROGEN, OXYGEN, OR SULFUR, CONSTITUTE FUNCTIONALLY IMPORTANT FRAGMENTS IN PHARMACEUTICALS SUCH AS IMATINIB (ANTI-CANCER) AND LISURIDE (ANTI-PARKINSON'S) AND ARE FOUND IN ABOUT 60% OF FDA APPROVED DRUGS. THESE HETEROCYCLES CAN BE SYNTHESIZED VIA C-H ACTIVATION, A REACTION THAT IS EXTREMELY USEFUL IN ORGANIC CHEMISTRY. C-H ACTIVATION DESCRIBES THE DIRECT BREAKING AND TRANSFORMATION OF NORMALLY UNREACTIVE CARBON-HYDROGEN BONDS, WHICH CAN POTENTIALLY BE LEVERAGED TO SYNTHESIZE BIOLOGICALLY-IMPORTANT MOLECULES. WITHIN THIS NICHE, HETEROCYCLIC COMPOUNDS HAVE BEEN PREPARED BY REACTING C-H BONDS WITH ELECTRON-POOR ALKENES AND ALKYNES. THE HETEROCYCLES FORMED IN THIS REACTION MAKE UP COMMON FRAGMENTS OF NUMEROUS PHARMACEUTICALS AND PLAY AN INTEGRAL PART IN MEDICINAL CHEMISTRY. HOWEVER, ANALOGOUS REACTIVITY WITH ELECTRON-RICH SUBSTRATES IS RARE. MY RESEARCH LAB DESCRIBED THE FIRST EXAMPLES OF SUCH A PROCESS WITH ELECTRON-RICH ALKENES AND I PROPOSE TO EXPAND THE SCOPE OF THIS REACTION TO INCLUDE ELECTRON-RICH ALKYNES AS SUBSTRATES. I PLAN TO DEVELOP DIFFERENT ELECTRON-RICH ALKYNES TO REACT WITH THE C-H BONDS OF BENZAMIDES. THE REACTIONS WILL BE STUDIED UNDER AN OXYGEN-FREE ENVIRONMENT, AND ANALYSES WILL BE CONDUCTED VIA HYDROGEN AND CARBON NUCLEAR MAGNETIC RESONANCE (NMR) AS WELL AS HIGH-RESOLUTION MASS SPECTROSCOPY (HRMS). I HAVE RECENTLY OBTAINED PRELIMINARY DATA IN WHICH A BENZAMIDE REACTS WITH AN YNAMIDE TO PRODUCE TWO NEW NITROGEN-CONTAINING HETEROCYCLES THAT HAVE NEVER APPEARED IN THE CHEMICAL LITERATURE. I PREDICT THAT THE NOVEL NATURE OF THIS PROJECT REPRESENTS UNCHARTED TERRITORIES IN STUDYING NEW CHEMICAL SPACE FOR MEDICINAL CHEMISTRY.

HUGO WU, CELL, MOLECULAR, DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): JAIMIE VAN NORMAN

INVESTIGATING THE LOCALIZATION AND FUNCTION OF MUTANT VERSION OF WFL AND KOIN IN ARABIDOPSIS ROOT

AN IMPORTANT ASPECT OF CELL BIOLOGY IS THE ASYMMETRIC OR POLAR DISTRIBUTION OF PROTEINS WITHIN THE CELL. PROTEINS THAT HAVE POLAR DISTRIBUTION HAVE IMPORTANT FUNCTIONS IN PLANT GROWTH AND DEVELOPMENT, HOWEVER, ONLY A FEW PLANT PROTEINS WITH POLAR LOCALIZATION, EXCLUDING TRANSPORTERS, HAVE BEEN IDENTIFIED. THIS PROJECT WILL EXPLORE THE FUNCTION AND LOCALIZATION OF TWO ARABIDOPSIS TRANSMEMBRANE RECEPTOR KINASES CALLED WFL AND KOIN. THESE TWO KINASES ARE LOCALIZED TO THE INNER SIDE OF THE PLASMA MEMBRANE IN ROOT CELL TYPES. TO UNDERSTAND HOW THESE PROTEINS LOCALIZE WE GENERATED TRUNCATED VERSIONS THAT ARE MISSING THE INTRACELLULAR KINASE DOMAIN. THE TRUNCATED VERSIONS OF EACH PROTEIN FAILED TO SHOW ITS NORMAL POLAR LOCALIZATION. THUS, WE HYPOTHESIZED THAT SPECIFIC REGIONS OF THE KINASE DOMAIN ARE IMPORTANT FOR WFL AND KOIN LOCALIZATION AND FUNCTION. TO TEST THIS, SPECIFIC REGIONS WERE TARGETED FOR MUTATION AND THEN MUTANT VERSIONS OF EACH OF THESE PROTEINS WERE TAGGED WITH FLUORESCENT PROTEIN; THEN, INTEGRATED INTO PLANT EXPRESSION VECTORS. THE EXPRESSION VECTORS WERE VALIDATED TO CONFIRM THAT THE SPECIFIC MUTATIONS WERE PRESENT. THEN THE MUTANT VERSIONS OF THE PROTEINS WERE TRANSFORMED INTO ARABIDOPSIS PLANTS. SEEDS FROM THE FIRST GENERATION AFTER TRANSFORMATION WERE COLLECTED, GROWN ON MEDIUM CONTAINING A SELECTIVE AGENT, THEN TRANSPLANTED TO GROW TO MATURITY. LATER GENERATIONS OF THESE PLANTS WILL BE ANALYZED FOR PROTEIN LOCALIZATION AND FUNCTION.

SAMHITHA YADALLA, BIOLOGY

FACULTY MENTOR(S): KURT ANDERSON

BLEPHARISMA CANNIBALISM AS A FUNCTION OF PREY SPECIES SIZE AND ABUNDANCE

BLEPHARISMA IS A MODEL UNICELLULAR PROTIST THAT HAS A TROPHIC POLYMORPHISM WITH THREE STATES— MICROSTOMES, MACROSTOMES, AND CANNIBALS. IN THIS PROJECT, THE AIM IS TO BETTER UNDERSTAND THE INTRAGUILD RELATIONSHIP BETWEEN BLEPHARISMA AND ITS FOOD SOURCES (WITH TETRAHYMENA AND COLPIDIUM AS THE INTRAGUILD PREY SPECIES AND BACTERIA AS THE BASAL RESOURCE). OUR PREVIOUS OBSERVATIONS SUGGEST THAT BLEPHARISMA, AS A CANNIBAL, CONSUMES LARGER PREY, THUS INCREASING IN BODY SIZE TO BECOME THE TOP PREDATOR AND STABILIZING THE SYSTEM BY PREVENTING OVEREXPLOITATION. WE ASSEMBLED THREE TREATMENTS IN A BACTERIA BASED MEDIUM TO EXPLORE THIS FURTHER: TREATMENT ONE, WITH ONLY BLEPHARISMA, TREATMENT TWO AND THREE ADDING TETRAHYMENA, AND COLPIDIUM, RESPECTIVELY. CHANGES IN ABUNDANCE OF THE PREY AND PREDATORS AND THE MORPHOLOGY OF THE BLEPHARISMA SPECIES WERE OBSERVED AND RECORDED TRI-WEEKLY OVER THE COURSE OF 1.5 MONTHS. PRELIMINARY RESULTS SUGGEST THAT THE BLEPHARISMA SPECIES' MORPHOLOGY WERE AFFECTED BY THE PRESENCE OF DIFFERENT PREY SPECIES AS A FUNCTION OF THEIR SIZE. THE EARLIEST EMERGENCE OF THE CANNIBALISM POLYMORPHISM OCCURRED IN THE TREATMENT WITH COLPIDIUM AS A PREY SPECIES, REGULATING THE PREDATOR POPULATION, PREVENTING OVEREXPLOITATION OF COLPIDIUM, AND ENHANCING LONG-TERM PERSISTENCE OF THIS IGP SYSTEM. THIS RESEARCH CONTRIBUTES TO THE GENERAL UNDERSTANDING OF HOW TROPHIC POLYMORPHIC PREDATORS ARE INFLUENCED BY THE SIZE OF THEIR PREY AND THEIR OWN BODY SIZE, AND THEREFORE THE LONG TERM COEXISTENCE OF THE SYSTEM. THROUGH THE INTERPRETATION OF MECHANISMS DRIVING FOOD WEB STABILITY, LIKE CANNIBALISM, THE BIODIVERSITY OF LIFE ON EARTH CAN BE ENHANCED AND PROTECTED.

ABBIE YEE, MICROBIOLOGY

FACULTY MENTOR(S): KERRY MAUCK

NON-HOST PLANTS PROLONG TOMATO POTATO PSYLLID SURVIVAL WHEN HOST PLANTS ARE ABSENT

THE TOMATO POTATO PSYLLID (TPP, BACTERICERA COCKERELLI) IS A CROP PEST AND VECTOR OF CANDIDATUS LIBERIBACTER SOLANACEARUM (LSO) BACTERIA, THE CAUSAL AGENT OF ZEBRA CHIP DISEASE IN POTATOES AND YELLOWING DISEASES IN OTHER CROPS. TPP ACQUIRES AND INOCULATES LSO WHEN FEEDING FROM THE PHLOEM OF INFECTED HOST PLANTS. RECENT RESEARCH ON ANOTHER PSYLLID VECTOR OF A RELATED PATHOGEN (DIAPHORINA CITRI) SUGGESTS THAT IT CAN UTILIZE NON-HOST PLANTS TO OBTAIN NUTRIENTS IN THE ABSENCE OF SUITABLE RESOURCES. HOWEVER, TPP HASN'T BEEN EVALUATED TO DETERMINE IF IT CAN ALSO USE NON-HOST PLANTS TO PROLONG SURVIVAL WHEN OTHER HOSTS AREN'T AVAILABLE. THE AIM OF THIS EXPERIMENT WAS TO DETERMINE THE SURVIVAL RATE OF TPP ON THE NON-HOST PLANT, ARABIDOPSIS THALIANA, COMPARED TO TOMATO, A KNOWN HOST. A PRIOR PILOT EXPERIMENT WITH D. CITRI AND TPP SHOWED TPP COULD SURVIVE ON A. THALIANA FOR AT LEAST 6 DAYS. WE FOLLOWED THIS PILOT EXPERIMENT WITH A LARGER SURVIVAL TEST THAT INCLUDED 10 PLANTS EACH OF TOMATO AND ARABIDOPSIS, AS WELL AS A CONTROL CAGE WITH NO PLANT. PSYLLIDS WERE MONITORED DAILY UNTIL ALL HAD DIED ON THE ARABIDOPSIS PLANTS. OUR RESULTS SHOW THAT TPP CAN SURVIVE FOR 6 DAYS AT MOST ON THE NON-HOST PLANT, COMPARED TO 2-3 DAYS AT MOST GIVEN NO PLANT, INDICATING THAT THE TPP WERE ABLE TO FEED AND GAIN SOME NUTRIENTS FROM A. THALIANA. IF SURVIVAL OF LSO POSITIVE TPP CAN BE INCREASED BY A FEW DAYS FROM NON-HOST PLANTS, IT MAY AID IN TPP PERSISTENCE BETWEEN CROP CYCLES.

JUN YIN LUM, ENTOMOLOGY

FACULTY MENTOR(S): CHOW-YANG LEE

COMPARATIVE STUDY ON THE ANTHROPOGENIC INFLUENCE ON DISTRIBUTION OF THE LONG-LEGGED ANT AND ARGENTINE ANT

THE LONG-LEGGED ANT (*ANOPLOLEPIS GRACILIPES*) AND THE ARGENTINE ANT (*LINEPITHEMA HUMILE*) ARE HIGHLY INVASIVE TRAMP ANTS WELL-KNOWN FOR THEIR DELETERIOUS EFFECTS ON NATIVE ECOSYSTEMS WHERE THEY HAVE BEEN INTRODUCED. WHILE TRAMP ANTS, BY DEFINITION, ARE ASSOCIATED WITH HUMAN ACTIVITY, RESEARCH ON HOW DIFFERENT INTENSITIES OF HUMAN ACTIVITY AFFECT ANT DISTRIBUTION IS LIMITED. THIS STUDY INVESTIGATED HOW ANTHROPOGENIC ACTIVITIES AFFECTED THE DISTRIBUTION OF *A. GRACILIPES* IN PENANG ISLAND (MALAYSIA) AND *L. HUMILE* IN RIVERSIDE, CALIFORNIA (USA). THREE STUDY SITES WERE SELECTED FOR EACH SPECIES. EACH SITE CONTAINED FOUR SUB-LOCATIONS CORRESPONDING TO FOUR DIFFERENT LEVELS OF HUMAN ACTIVITY (LOW, MODERATE, HIGH, VERY HIGH) AS DETERMINED BY THE AVERAGE NUMBER OF PASSERSBY OBSERVED OVER 30 MINUTES. BAITED INDEX CARDS WERE PLACED AT EACH SUB-LOCATION TO EVALUATE ANT ABUNDANCE AND DISTRIBUTION. SUBSEQUENTLY, GENERAL LINEAR MODELING WITH POISSON REGRESSIONS WAS USED TO ASSESS THE RELATIONSHIP BETWEEN HUMAN ACTIVITY AND ANT ABUNDANCE. THE RESULTS DEMONSTRATE THAT *A. GRACILIPES* DISTRIBUTION PATTERNS WERE CONSISTENT WITH THE PREVIOUS STUDY, WITH ANT ABUNDANCE BEING HIGHEST IN AREAS OF MODERATE HUMAN ACTIVITY. IN CONTRAST, *L. HUMILE* ABUNDANCE WAS NOT SIGNIFICANTLY CORRELATED WITH HUMAN ACTIVITY.

DARREN YOHANN, PHYSICS, PURE MATHEMATICS

FACULTY MENTOR(S): LAURA SALES

THE ORIGIN OF LENTICULAR GALAXIES AND COMPACT DWARFS WITHIN GALAXY CLUSTERS

IN THIS STUDY, WE INSPECT THE MORPHOLOGICAL PROPERTIES OF >50 SIMULATED MERGERS INSIDE 3 GALAXY CLUSTERS IN ORDER TO CONSTRUCT A MORE REFINED HYPOTHESIS FOR THE ORIGIN OF LENTICULAR GALAXIES AND COMPACT DWARFS. MOST GALAXIES IN THE UNIVERSE ARE CLASSIFIED AS DISKS OR ELLIPTICALS BASED ON THEIR MORPHOLOGY. HOWEVER, IN GALAXY CLUSTERS THE MORPHOLOGICAL VARIETY WIDENS, FOR EXAMPLE, BY INCLUDING LENTICULARS AND COMPACT DWARF GALAXIES. MERGERS HAVE BEEN HYPOTHESIZED AS POSSIBLE FORMATION SCENARIO FOR THESE GALAXIES, BUT MERGERS SHOULD BE UNCOMMON IN CLUSTERS DUE TO THEIR HIGH ORBITAL VELOCITIES. WE USE THE ILLUSTRIS/TNG NUMERICAL HYDRODYNAMIC SIMULATIONS TO STUDY WHETHER THE PRE-PROCESSING OF GALAXIES IN SMALLER GROUPS BEFORE JOINING THE CLUSTERS MIGHT PROVIDE THE NECESSARY CONDITIONS FOR SUCH MERGERS TO OCCUR, CREATING REMNANTS WITH MORPHOLOGIES CONSISTENT WITH OBSERVED LENTICULARS AND COMPACT DWARFS.

BRIAN ZHANG, CELL, MOLECULAR, AND DEVELOPMENTAL BIOLOGY

FACULTY MENTOR(S): KATAYOON DEHESH

INVESTIGATING THE CALCIUM SIGNATURE OF MECPP-MEDIATED SIGNALING IN EUBACTERIA

EUBACTERIA AND PLANTS HAVE EVOLVED GENERAL STRESS RESPONSE NETWORKS TO COPE WITH EVER-CHANGING EXTERNAL ENVIRONMENTS. THE METHYLERYTHRITOL PHOSPHATE (MEP) PATHWAY IS AN EVOLUTIONARILY CONSERVED PATHWAY PRODUCING ISOPRENOIDS IN BACTERIA, PLANTS, AND MALARIA. METHYLERYTHRITOL CYCLODIPHOSPHATE (MECPP) IS AN MEP-PATHWAY INTERMEDIATE METABOLITE AND FUNCTIONS AS A RETROGRADE SIGNALING MOLECULE THAT ACCUMULATES UPON STRESS. MECPP MEDIATES THE INDUCTION OF THE STRESS-RESPONSIVE CIS-ELEMENT RAPID STRESS RESPONSE ELEMENT (RSRE) BY THE CALCIUM-CALMODULIN TRANSCRIPTIONAL ACTIVATOR 3 (CAMTA3), WHICH ULTIMATELY LEADS TO THE EXPRESSION OF GENERAL STRESS RESPONSE GENES. EXOGENOUS APPLICATION OF MECPP INDUCES SUBCELLULAR FLUCTUATIONS OF CALCIUM IN ARABIDOPSIS PLANTS. THESE STUDIES WERE EXPANDED TO EUBACTERIA DUE TO THE CONSERVED NATURE OF THE MEP PATHWAY IN EUBACTERIA AND PLANTS. AN E. COLI STRAIN (NAMED CRISPRI-ISP G) ACCUMULATING A

HIGH LEVEL OF MECPP WAS GENERATED USING THE CRISPRi SYSTEM TO SUPPRESS THE EXPRESSION OF ISPG, THE SOLO ENZYME CATALYZING THE CONVERSION OF MECPP TO HMBPP IN THE E. COLI MEP PATHWAY. CALCIUM SIGNATURES INDUCED BY THE ACCUMULATED MECPP WILL BE EXAMINED BY TRANSFORMING A GENETICALLY ENCODED CALCIUM SENSOR GCAMP6F-MRUBY3. WE WILL FURTHER INVESTIGATE SIGNALING COMPONENTS OF THE MECPP-MEDIATED SIGNALING BY GENERATING AND SCREENING A MUTANT LIBRARY WITH AN ALTERED CALCIUM SIGNATURE IN THE BACKGROUND OF THE HIGH MECPP ACCUMULATING E. COLI STRAIN. THIS GENETIC SCREENING WILL PROVIDE AN INSIGHT INTO THE CALCIUM-DEPENDENT NATURE OF MECPP-MEDIATED SIGNALING.

SELIM ZOOROB, PHYSICS

FACULTY MENTOR(S): HUINAN LIU

MEDICAL VENTILATOR ADDON SPLITTER

THIS RESEARCH IS AIMED TO SOLVE A PROBLEM THAT HAS EMERGED DURING THE 2020 COVID-19 PANDEMIC: THE LACK OF MEDICAL VENTILATORS. THIS IS IMPORTANT TO EVERYONE, AS NO ONE IS COMPLETELY SAFE FROM BEING AFFECTED BY THE COVID-19 VIRUS. MEDICAL VENTILATORS ASSIST PATIENTS IN THEIR BREATHING, WHICH COULD BE A LIFE SAVIOR DEVICE. THIS RESEARCH WILL FOCUS ON THE DEVELOPMENT OF AN ADD-ON THAT COULD LET ANY MEDICAL VENTILATOR SUPPORT SIX PEOPLE AT ONCE.

THE MEDICAL ADD-ON WILL BE DEVELOPED IN A WAY THAT ANYONE WITH A BASIC 3D PRINTER CAN PRINT IN AND USE IT. IT IS A SOLUTION THAT COULD REACH A WORLD-WIDE SCALE.

TO GATHER THE NEEDED DATA, A LOT OF TESTING NEEDS TO BE DONE. PRESSURE TESTING NEEDS TO BE SUCH AND SEVERAL OTHER TESTS THAT ASSURE THAT THE ADD-ON IS SAFE TO USE. WE INTEND TO MINIMIZE THE RISK OF CONTAMINATION BETWEEN PATIENTS USING THE OPTIMAL DESIGN AND AIR PRESSURE. AN OPTIMAL DESIGN WILL BE SELECTED IN TERMS OF SIZE, COST, EFFICIENCY, AND SAFETY. THAT OPTIMAL DESIGN WILL BE SCALED TO FIT DIFFERENT KINDS OF MEDICAL VENTILATORS.

THE PROJECT UNITES MEDICINE TO ENGINEERING TO CREATE A SOLUTION FOR AN UNFORTUNATE PROBLEM. IT IS MORE THAN A RESEARCH PROJECT; IT IS A PASSION PROJECT.

SCHOOL OF BUSINESS

HELENA CO, BUSINESS

FACULTY MENTOR(S): SEAN JASSO

ON OUR OWN TURF: DIFFERENTIATION STRATEGY AGAINST A LOW-COST LEADER

IN THE INTERNATIONAL COLLEGIATE BUSINESS STRATEGY COMPETITION, BUSINESS SCHOOLS COMPETE AND PLAY THE BUSINESS POLICY GAME, A COMPUTER-BASED SIMULATION OF A MANUFACTURING FIRM WITH DOMESTIC AND INTERNATIONAL SUBSIDIARIES THAT PRODUCE AND SELL DURABLE CONSUMER PRODUCTS. UNDERGRADUATE AND MBA STUDENT TEAMS COMPETE AS THE FIRM'S MANAGEMENT IN DIFFERENT "WORLDS" WITH THREE TO FIVE OTHER COMPETITORS FROM YEARS THREE TO SEVEN, OR FIVE SIMULATED YEARS. THESE TEAMS ARE RESPONSIBLE FOR WRITING AND IMPLEMENTING THEIR FIRM'S STRATEGIC BUSINESS PLAN AND ANNUAL REPORT. AS PART OF UCR'S UNDERGRADUATE TEAM, "EVERBLÜ," WE COMPETE AGAINST OTHER SCHOOLS IN OUR WORLD BY USING A DIFFERENTIATION STRATEGY. WE ALIGN OUR UNIQUE PRODUCT POSITIONING WITH OUR BUSINESS CAPABILITIES, SUCH AS PRODUCT PRICING AND PRODUCTION. WE USE NET INCOME, STOCK PRICE, AND EARNINGS TO MEASURE OUR SUCCESS. EVERBLÜ HAS SUCCESSFULLY COMPETED AGAINST OUR COMPETITORS, ESPECIALLY ONE THAT IS A LOW-COST LEADER. DURING YEARS THREE TO FOUR, EVERBLÜ ACHIEVED THE HIGHEST CONSOLIDATED NET INCOME AND THE SECOND-HIGHEST STOCK PRICE AND EARNINGS PER SHARE. CURRENTLY (YEAR FIVE), WE STRIVE TO INCREASE OUR PRODUCTION CAPACITIES TO MEET OUR CONSUMERS' GROWING DEMAND.

CARLIN DENG, BUSINESS ADMINISTRATION

FACULTY MENTOR(S): SEAN JASSO

MACY'S MARKETING PLAN

CONSIDERING A DECLINING INTEREST IN DEPARTMENT STORES, IT IS NECESSARY TO ADAPT AND DIFFERENTIATE. THIS MARKETING PLAN FURTHER EXPANDS MACY'S POSITION ON HOME GOODS, SPECIFICALLY KITCHENWARE. IT UTILIZES THE 12-PIECE COOKWARE SET FROM THE MARTHA STEWART COLLECTION TO JUMP-START A NEW INTEREST IN THE PRODUCT. MACY'S NEEDS TO ADAPT TO THE CHANGING INDUSTRIES, AND THIS PLAN WILL HELP THE COMPANY SHIFT ITS BASE TOWARDS STRENGTHENING THE FOUNDATION FOR E-COMMERCE SALES. COOKWARE DEMAND VARIES FROM YEAR TO YEAR, SO THIS PLAN'S GOAL IS TO ESTABLISH A STRONG POSITION IN THE KITCHENWARE MARKET FOR MACY'S INC. TO BUILD OFF AND GENERATE MORE REVENUE. IT ALSO SERVES TO DIFFERENTIATE MACY'S FROM THE COMPETITORS, ESTABLISHING A NICHE IN THE MARKET. FINALLY, IT HELPS REMIND CONSUMERS OF MACY'S BRAND VALUES. THE PLAN ASKS TO HIRE TECH EMPLOYEES TO HELP EXPAND THE E-COMMERCE WEBSITES TO ASSIST IN EXPANDING THE E-COMMERCE SERVICES WHILE ALSO CALCULATING A PROJECTED DEMAND FOR THE PRODUCT. PRODUCTION OF THE COOKWARE SHOULD BE LIMITED AT THE START WITH MORE FOCUS ON MARKETING THE MARTHA STEWART COLLECTION TO ENSURE INTEREST IN THE PRODUCT.

RYAN GRIJALVA, BUSINESS ADMINISTRATION

FACULTY MENTOR(S): SEAN JASSO

JOE'S FLEA MARKET

CORPORATE SOCIAL RESPONSIBILITY (CSR) IS A CORPORATION'S PRACTICES AND POLICIES AIMED AT PROVIDING SOLUTIONS TO CURRENT POLITICAL, ECONOMIC, ENVIRONMENTAL, AND/OR SOCIAL ISSUES. MANY CORPORATIONS USE IT TO PROMOTE AWARENESS OF ISSUES, BOOST

EMPLOYEE MORALE, AND INCREASE CUSTOMER RETENTION. FOR OUR BUSINESS WRITING CLASS, OUR GROUP CREATED A CSR EVENT PROPOSAL FOR TRADER JOE'S CORPORATION. TRADER JOE'S HAS UTILIZED CSR EVENTS SINCE ITS INCEPTION IN 1958 BY DONATING TO FOOD PANTRIES, HOSTING BLOOD DRIVES, AND DONATING FUNDS TO HELP WITH THE COVID-19 PANDEMIC. TO DIVERSIFY THE COMPANY'S MARKET AND INCREASE AWARENESS OF ITS MISSION, WE PROPOSE THAT THE NEXT CSR EVENT FOR TRADER JOE'S SHOULD BE A "FLEA MARKET" FOR COLLEGE STUDENTS. "JOE'S FLEA MARKET" WILL BE A MULTI-DAY EVENT HOSTED ON THE UNIVERSITY OF CALIFORNIA, RIVERSIDE CAMPUS. THE EVENT WILL INCLUDE FOOD VENDORS AND GIVE STUDENTS A CHANCE TO SHOWCASE THEIR ART AND MUSICAL WORKS. THE GOAL OF THIS CSR EVENT IS TO CONNECT TRADER JOE'S WITH THE COLLEGE DEMOGRAPHIC BY PROMOTING THEIR HEALTHY AND AFFORDABLE FOOD OPTIONS. NOT ONLY WILL THIS EVENT HELP COLLEGE STUDENTS FURTHER ENGAGE WITH A HEALTHIER LIFESTYLE, BUT THEY WILL ALSO BE ABLE TO SHOWCASE THEIR OWN WORK AND SUPPORT THOSE AROUND THEM. THERE WILL BE A LONG-TERM GAIN FOR BOTH THE TRADER JOE'S CORPORATION, BY GAINING A NEW SEGMENT IN THE MARKET, AND FOR COLLEGE STUDENTS, WHO MAY NEED FURTHER INFORMATION ABOUT HEALTHY LIVING.

GORANG GUPTA, BUSINESS ADMINISTRATION

FACULTY MENTOR(S): SEAN JASSO

EFFECTIVE AND PURPOSEFUL ORGANIZATIONAL BEHAVIOR CAN REVIVE AN INTERNALLY BROKEN COMPANY

MOST COMPANIES USE DIFFERENT FINANCIAL MARKERS TO DETERMINE THEIR ORGANIZATIONS' SUCCESS EVERY QUARTER AND YEAR, HENCE THE POPULAR TERMS QUARTER AND ANNUAL REVENUE AND SALES GROWTH REPORTS. WHEN NOTICEABLE INTERNAL AND EXTERNAL PROBLEMS EXIST OR THE COMPANY IS NOT AS PRODUCTIVE AND EFFICIENT AS THEY ONCE WERE, MOST TOP-LEVEL MANAGEMENT WILL TURN TO SELF-REFLECT AND ANALYZE PROCESSES WITHIN THE COMPANY THAT COULD BE MORE COST EFFICIENT. HOWEVER, SOME OF THESE COMPANIES OVERLOOK IMPORTANT ORGANIZATIONAL BEHAVIOR ASPECTS THAT CAN LITERAL BE KILLING THE COMPANY FROM THE INSIDE OUT. ORGANIZATIONAL BEHAVIOR, AS DEFINED BY INVESTOPEDIA, IS THE ACADEMIC STUDY OF HOW PEOPLE INTERACT WITHIN GROUPS, MAINLY TO MAKE AN ORGANIZATION OPERATE MORE EFFECTIVELY [1]. MY TEAM AND I REVIEWED A CASE STUDY ABOUT A FICTIONAL COMPANY THAT FACED A PLETHORA OF FINANCIAL, MARKETING, AND OPERATIONAL ISSUES. OUR TASK WAS TO ACT AS A 3RD PARTY CONSULTING FIRM AND THOROUGHLY ANALYZE THE COMPANY'S ORGANIZATIONAL BEHAVIOR TO PROBLEM SOLVE CURRENT AND RISING ISSUES FACING THIS COMPANY. AFTER OUR EXTENSIVE RESEARCH, WE FOUND MANY OF THE COMPANIES' FINANCIAL AND MARKETING FAILURES TO EXTEND FROM KEY ORGANIZATIONAL BEHAVIOR FUNDAMENTALS THAT REQUIRED A COMPLETE INTERNAL MAKEOVER OF THIS COMPANY. IN THIS PAPER, WE DISCUSS KEY SOLUTIONS AND THE IMPORTANCE OF REBRANDING COMPANY CULTURE, IMPLEMENTING EFFICIENT AND FREQUENT COMMUNICATION METHODS, AS WELL AS, HEALING THE DIVIDE AND CREATING COMMON GOALS BETWEEN LEADERSHIP AND THE EMPLOYEES. OUR RESEARCH OF EFFECTIVE ORGANIZATIONAL BEHAVIOR MODELS REFLECT IMPORTANT WAYS CURRENT COMPANIES, GROUPS, AND ORGANIZATIONS CAN DEVELOP SUCCESS INTERNALLY AND PREVENT FUTURE CONFLICT.

GEORGE MAALOUF, BUSINESS ADMINISTRATION, FINANCE

FACULTY MENTOR(S): SEAN JASSO

POSITIONING IS EVERYTHING: FORD MOTOR'S MARKETING PLAN

THE VEHICLE MANUFACTURER AND DISTRIBUTOR, FORD MOTOR COMPANY, RECOGNIZES THE IMPORTANCE OF REPOSITIONING THEMSELVES IN THE TRANSPORTATION MARKET TO BECOME ENVIRONMENTALLY FRIENDLY AS MORE ELECTRIC VEHICLES GAIN POPULARITY. CURRENTLY, FORD MOTORS HAS A PRODUCT LINE CONSISTING OF MAINLY GASOLINE POWERED VEHICLES WITH THE EXCEPTION OF SOME HYBRIDS. USING THE MARKETING MIX MODEL, FORD REIMAGINED TWO OF THEIR MOST PROMINENT BEST-SELLING VEHICLES, THE F-150 AND MUSTANG, TO BECOME 100% ELECTRIC AND ESTABLISH THEMSELVES AS A NEW, STRONG COMPETITOR IN THE ELECTRIC VEHICLE MARKET. THE FORD MARKETING PLAN BEGINS WITH A DETAILED EXPLANATION OF WHAT FORD MOTORS IS, AND EXPLAINS THE COMPANY MISSION STATEMENT

AND GOALS. THE MARKETING PLAN GOES ON TO DETAIL THE CURRENT MARKETING SITUATION, WHICH ENTAILS A MARKET DESCRIPTION, PRODUCT REVIEW, COMPETITION AND DISTRIBUTION SECTIONS. THIS PLAN ALSO INCLUDES COMPREHENSIVE SWOT ANALYSIS, OBJECTIVE AND ISSUES, A DEFINED MARKETING STRATEGY, AND LASTLY, AN ACTION PROGRAM. THE MARKETING PLAN CONCLUDES BY EXPLAINING THE CONTROLS IMPLEMENTED INTO THE MARKETING PLAN TO CREATE A SATISFYING CUSTOMER EXPERIENCE FOR INDIVIDUALS LOOKING TO PURCHASE FORD'S NEW PRODUCTS.

MELANIE PINEDA, FINANCE

FACULTY MENTOR(S): SEAN JASSO

CINEMATION'S POINT OF VIEW PUTTING POWER ON YOUR SIDE

CURRENTLY THE MARKET VALUE FOR THE FILM INDUSTRY IS GLOBALLY \$38, 204 MILLION DOLLARS AND \$16,434 MILLION LOCALLY WITHIN THE U.S. MARKET. THE OBTAINABLE MARKET FOR THE U.S INDUSTRY IN ENTERTAINMENT IS ROUGHLY ABOUT 43% WHICH COULD BE MAXIMIZED WITH THE PROPER RESOURCES AND BUSINESS MODELS. CINEMATION'S MISSION STATEMENT STATES, A PROFESSIONAL CONSULTING AGENCY WITH THE EXPERIENCE AND RESOURCES READY TO HELP SO YOU NEVER HAVE TO WORRY ABOUT SACRIFICING. WE BELIEVE POWER SHOULD ALWAYS BE ON YOUR SIDE, BECAUSE WE ARE DEDICATED TO A NEW WAY OF THINKING. THE ESSENCE OF CINEMATION IN FOUR WORDS IS, POWER IN YOUR SIDE. MELANIE PINEDA, THE FOUNDER BUILT A BUSINESS PLAN OVER THE COURSE OF ELEVEN WEEKS UNDER THE ASSISTANCE OF PROFESSOR SEAN JASSO. PROFESSOR SEAN JASSO IS A BELOVED INSTRUCTOR THAT HAS YEARS OF EXPERIENCE FROM WORKING IN THE CORPORATE BUSINESS SECTOR, INTERVIEWS, CONSULTING FOR INSTITUTIONS, AND MORE. MOVING THROUGH A WORLD THAT'S EVER EVOLVING BEING ABLE TO ARTICULATE YOURSELF CAN BE HARD TO MASTER, BUT RESEARCH CONDUCTED IN THIS STUDY HELPS GIVE CONCISE CLIFF NOTES. PRECISE FINDINGS ARE NOT LIMITED TO CREATING A 60 SECOND PITCH DECK, VALUE PROPOSITION, MARKET PLAN, COMPETITIVE ANALYSIS, FINANCIAL PROJECTIONS, BUSINESS TIMELINE, AND ETC.

EDUARD SARUKHANYAN, BUSINESS ADMINISTRATION

FACULTY MENTOR(S): SEAN JASSO

MONUMENT

MONUMENT - A FORTHCOMING ENTERPRISE WITH A MUTUALLY BENEFICIAL COMBINATION OF LEGAL AND CONSULTING SERVICES SET ITS MISSION TO EASE BUSINESS OWNERSHIP AND MAXIMIZE OUR CLIENTS' CHANCES OF REACHING THEIR DESIRED BUSINESS STATE. TO MOVE TOWARDS BECOMING THE HOME OF INNOVATION, MONUMENT FIRST WILL USE THIS COMBINATION TO BECOME A BUSINESS HELP CENTER - THE PLACE WHERE COMPANIES CALL WHEN ENCOUNTERING A PROBLEM, THE PLACE WHERE COMPANIES COME TO FIND OPPORTUNITIES OF GROWTH. IT'S NOT HARD TO SEE THAT IF A GOOD RELATIONSHIP WITH COMPANIES IS MAINTAINED, THEIR GROWTH WILL SUPPORT OUR GROWTH. ESPECIALLY IN OUR CASE, WHERE A GROWING BUSINESS MAY BE DONE WITH OUR CONSULTANCY, BUT STILL FACE LEGAL MATTERS IN THE FUTURE. BECAUSE OF THIS MUTUAL GROWTH (LIKE A PARTNERSHIP), IT'S IN OUR BEST, EFFICIENT, AND LONG-TERM INTEREST TO MINIMIZE THE CHANCES OF ISSUES OCCURRING. ALIGNMENT ASIDE, MONUMENT WILL BE THE PLACE TO GROW BUSINESS KNOWLEDGE AND TECHNOLOGIES. BY BEING IN THE B2B REGION, WE WILL COME UP AGAINST SITUATIONS IN A LARGE NUMBER OF DIVERGENT INDUSTRIES, INCLUDING TWO OF OUR OWN. WE WILL OBSERVE VARIOUS APPROACHES TOWARD SIMILAR ISSUES, ALONG WITH THEIR RESULTS. THE STRATEGIES PROVEN TO BE SUCCESSFUL CAN BE WIDELY USED IN EXISTING AND FUTURE CLIENTS' COMPANIES. THESE EXTENSIVE APPLICATIONS ARE PARTICULARLY USEFUL TO THE IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE. OUR ULTIMATE PRODUCT IS A MEMBERSHIP OF CORPORATE MASTERY THAT PROVIDES VALUABLE INSIGHTS AND SOLUTIONS. MONUMENT IS TARGETING SPECIALIZED INNOVATORS, AND OUR CULTURE PRIORITIZES ACHIEVEMENT, BENEVOLENCE, AND SELF-DIRECTION.

ABHISHEK VISHWASRAO, BUSINESS ADMINISTRATION

FACULTY MENTOR(S): SEAN JASSO

APPLE'S SOUNDS OF THE EARTH MARKETING STRATEGY

TO APPLE, INNOVATION IS NOT A VALUE, BUT A NECESSITY. BORN AND RAISED IN ONE OF THE MOST COVETED AND COMPETITIVE SLICES OF THE NATION, SILICON VALLEY, DESIGN PHILOSOPHY MEETS UNIQUE TECHNOLOGY. BY CREATING THE INNOVATION RATHER THAN CHASING IT, APPLE AND MORE SPECIFICALLY THE AIRPODS, REVOLUTIONIZED THE MARKET, INSPIRING COMPETITION THROUGH THE TWS OR TRULY WIRELESS EXPERIENCE MARKET. ALTHOUGH ABLE TO BOAST A MULTITUDE OF PRODUCTS ALL NETTING BILLIONS OF DOLLARS, OUR STUDY AND STRATEGIC PLAN LOOKS TO COMPETITION AND THE CURRENT MARKET OF SUSTAINABLE TWS PRODUCTS AS A NEW VENTURE FOR APPLE. IN THIS STRATEGY, WE LOOK TO REVITALIZE AND REVAMP INTEREST IN THE AIRPODS GIVEN SLIGHT DECREASE IN MARKET SHARE THROUGH PARTNERSHIPS AND RELATIONSHIPS WITH LARGE CONSERVATIONAL SOCIETIES, A KEY METRIC IN WINNING OVER THE TARGET MARKET SEGMENTED BELOW. WITH THE ADVENT OF THIS STRATEGY, WE LOOK FORWARD TO CREATING A CAMPAIGN THAT POSITIONS APPLE AS AN PROPONENT FOR SUSTAINABLE LIVING, FOCUSING LESS ON ADVERTISEMENTS TO ASSOCIATE AIRPODS WITH NATURAL BEAUTY. FROM THIS, WE FORECAST THAT AROUND 8 B IS LEFT FOR APPLE AS PROFIT, GIVEN DONATIONS, COST OF STRATEGY, AND IMPLEMENTATION. TO MEASURE, WE LOOK TO SALES AND MARKET SHARE AS OUR PRIMARY METRIC, KNOWING THAT REVAMPED INTEREST MEANS AN AUGMENTATION OF PROFIT. THE P.L.A.N.T.S METHOD HAS POTENTIAL, CARRYING WITH IT EMPHASIS OF CSR (CORPORATE SOCIAL RESPONSIBILITY) AND SUSTAINABILITY. BECAUSE OF THIS CHANCE, WE LOOK TO APPLE AS A DEMONSTRATION AND EXAMPLE OF SUSTAINABILITY WEAVED WITHIN STRATEGY.

SCHOOL OF EDUCATION

KENDELL FOLEY, EDUCATION, SOCIETY AND HUMAN DEVELOPMENT

FACULTY MENTOR(S): AMOS LEE

EXPLORING EDUCATION BASED DISPARITIES IN DIFFERENT ELEMENTARY SCHOOLS IN THE SAME INLAND EMPIRE SCHOOL DISTRICT

THROUGH THIS RESEARCH PROJECT, I PLAN TO EXPLORE THE INEQUITIES THAT EXIST BETWEEN DIFFERENT ELEMENTARY SCHOOLS THAT BELONG TO THE SAME INLAND EMPIRE SCHOOL DISTRICT. THIS AREA OF RESEARCH IS SIGNIFICANT BECAUSE OFTENTIMES INEQUITIES ARE EXAMINED ACROSS DIFFERENT SCHOOL DISTRICTS, BUT RARELY ARE THE INEQUITIES BETWEEN SCHOOLS IN THE SAME DISTRICT STUDIED IN DEPTH. I USE QUALITATIVE METHODS TO ANALYZE DOCUMENTS RELATED TO THE SCHOOLS AND THE DISTRICT TO BETTER UNDERSTAND THE SOCIO-POLITICAL CONTEXT IN WHICH THESE DISPARITIES EXIST AND OPERATE. USING A HISTORICAL APPROACH, I ALSO EXPLAIN BOTH HOW AND WHY THESE FUNDING INEQUITIES EXIST IN SCHOOLS BASED ON RACIAL DEMOGRAPHIC OF STUDENTS AND GEOGRAPHIC LOCATION IN THE COMMUNITY. MY FINDINGS SUGGEST THAT SCHOOL BASED INEQUITIES ARE DEEPLY ROOTED IN RACISM AND THE LACK OF COMMITMENT TOWARDS SCHOOLS THAT ARE MAJORITY STUDENTS OF COLOR IS NOT BY ACCIDENT. FROM THESE FINDINGS, ALLOWING DISPARITIES TO BE NORMALIZED IN SCHOOLS BASED IN THE SAME DISTRICT IS DANGEROUS AND THERE IS A NEED TO RESTRUCTURE THE WAYS IN WHICH DISTRICTS TREAT THE SCHOOLS UNDER THEIR CARE.

AMALIA RODRIGUEZ, EDUCATION

FACULTY MENTOR(S): COVADONGA LAMAR PRIETO

THE METHODOLOGY USED IN THE LETTERS FROM TOMAS RIVERA

THE RESEARCH WAS CONDUCTED FOR THE PURPOSE OF OUR PROJECT NAMED "PROYECTO TOMÁS RIVERA " IN THE CLASS SPN 130: DIGITAL DIALECTOLOGY BY DR. COVADONGA LAMAR PRIETO (SOCIALAB, UNIVERSITY OF CALIFORNIA RIVERSIDE) WITH FUNDING FROM THE POLLITT ENDOWED CHAIR. THIS PROJECT WAS DIVIDED IN MANY AREAS SUCH AS MANUSCRIPTS, GOOGLE DOCS, AND A DIGITAL PLATFORM WHICH ALLOWED US TO USE THE METHODOLOGY THAT RIVERA USED TO WRITE LETTERS AND POETRY.

TO START OFF, IT WAS DIVIDED INTO EQUAL PARTS THE LETTER FROM THE MANUSCRIPT TO TRANSCRIBE ALL OF TOMAS RIVERA'S LETTERS INTO A WORD DOCUMENT. IN THE PROCESS, IT WAS FOUND THAT IT WAS DIFFICULT TO UNDERSTAND SOME OF THE HAND WRITTEN WORDS. IT WAS EASIER TO READ THE WORDS IN SPANISH SINCE IT IS THEIR FIRST LANGUAGE AND FOR OTHERS IT WAS EASIER TO READ THE WORDS IN ENGLISH. THE LAST PART WAS TO COLLECT ALL THE TRANSCRIBED DOCUMENTS AND TRANSFER THEM TO A DIGITAL PLATFORM, AIRTABLE. WITH AIRTABLE, THE GROUP ORGANIZES THE INFORMATION AND MAKES SURE THAT WE HAVE THE MINIMUM ERROR BY THE TIME OF HANDING IT OVER TO THE LIBRARIAN. WITH THE PURPOSE OF SHARING MORE LETTERS FROM RIVERA TO ALL UCR ALUMNI. THIS PROJECT ALLOWED US TO COLLABORATE WITH THE LEGACY OF RIVERA FOR NEW GENERATIONS TO KNOW ABOUT HIM. IT ALSO GIVES US A LITTLE MORE INSIGHT INTO WHAT RIVERA WAS LIKE AS A WRITER, ALSO HIS FUTURE PLANS FOR WHAT HE WANTED TO DO WITH HIS WRITING IN BOTH LANGUAGES, ENGLISH AND SPANISH.

SCHOOL OF MEDICINE

BATIS GOLESTANY, BIOLOGY

FACULTY MENTOR(S): SEEMA TIWARI-WOODRUFF

COMBINED THERAPY TO INDUCE NEUROPROTECTION IN A MOUSE MODEL OF MULTIPLE SCLEROSIS

MULTIPLE SCLEROSIS (MS) IS A CHRONIC INFLAMMATORY AND NEURODEGENERATIVE DISEASE, LEADING TO VISUAL, MOTOR, AND COGNITIVE IMPAIRMENTS. MS HAS PROFOUND DELETERIOUS EFFECTS IN THE VISUAL PATHWAY, INCLUDING RETINAL GANGLION CELL (RGC) DEATH AND AXON DEGENERATION, SOMETIMES WITH IRREVERSIBLE CONSEQUENCES (THOMSON, 2018). INHIBITING RGC DEATH, ALONG WITH REMYELINATING STRUCTURALLY INTACT AXONS, CAN GREATLY PREVENT DISEASE PROGRESSION. MOST THERAPEUTIC DRUGS ARE IMMUNOMODULATORY AND THERE IS AN UNMET NEED FOR THERAPIES THAT PROVIDE NEUROPROTECTION AND REMYELINATION. CALPAIN, A CALCIUM DEPENDENT PROTEASE, HAS BEEN OBSERVED AS A POTENTIAL CONTRIBUTOR TO NEUROLOGICAL IMPAIRMENT IN MS AND HAS BEEN SHOWN TO UPREGULATE IN MS LESIONS. CALPAIN INCREASE IN EAE WAS MITIGATED BY CALCIUM INHIBITORS IN A STUDY PERFORMED BY BANIK RESEARCH GROUP (SHIELDS, 1999). OUR GROUP HAS SHOWN SIGNIFICANT REMYELINATING AND IMMUNOMODULATORY EFFECTS USING AN ESTROGEN RECEPTOR BETA LIGAND, INDAZOLE-CL AND ITS ANALOGUES (KARIM, 2019) IN EXPERIMENTAL AUTOIMMUNE ENCEPHALOMYELITIS (EAE). IN ORDER TO BETTER UNDERSTAND THE ROLE OF AXON DAMAGE IN MULTIPLE SCLEROSIS, OUR LAB RAN VEP/ERG EXPERIMENTS IN EAE MICE IN ORDER TO ASSESS CHANGES IN VISUAL FUNCTION IN VIVO. THESE MICE WERE TREATED WITH AN ANALOGUE OF INDCL (O-METHYL), WHICH SHOWED GREAT EFFECTS IN ATTENUATING DEMYELINATION AND INFLAMMATION SEEN IN MS. FURTHERMORE, WE STAINED VARIOUS OPTIC NERVE AND RETINA SECTIONS IN ORDER TO SEE THE EFFECTS OF INDCL O-METHYL ON OUR EAE MICE. STAINING FOR MBP, CASPASE, AND DAPI, WE COLLECTED DATA SUPPORTING THE BENEFICIAL EFFECTS OF OUR INDCL AND ITS VARIOUS ANALOGUES. IN THIS PROPOSAL, I WILL TEST THE HYPOTHESIS THAT EARLY COMBINED TREATMENT WITH A CALCIUM INHIBITOR, BLD-2660 (IMPERIAL, 2020) AND THE REMYELINATING AGENT, INDCL (MOORE, 2014), WILL PROTECT RGCs, OPTIC NERVE AND OPTIC TRACT AXONS, INITIATE REMYELINATION, AND ALLEVIATE VISUAL DYSFUNCTION DURING EAE.

SCHOOL OF PUBLIC POLICY

NIKA CHEGENIZADEH, PUBLIC POLICY

FACULTY MENTOR(S): ERIC SCHWITZBEGEL

THE RELATIONSHIP BETWEEN BELIEFS ON HUMAN NATURE AND POLITICAL IDEOLOGY

THIS STUDY SEEKS TO DISCOVER A RELATIONSHIP BETWEEN AN INDIVIDUAL'S POLITICAL IDEOLOGY AND THEIR BELIEF IN HUMAN NATURE. THE WAY IN WHICH HUMANS COMMUNICATE DEPENDS UPON THE INDIVIDUAL'S BELIEFS ABOUT HUMAN NATURE. IF ONE IS MORE INCLINED TO BELIEVE HUMANS ARE GOOD, THEN THAT INDIVIDUAL IS MORE OPEN TO CONNECTING WITH THE WORLD. HUMAN NATURE IN THIS STUDY WILL PRIMARILY REFER TO THE MORAL COMPASS OF HUMANS AND WHETHER A HUMAN IS BORN WITH THAT TOOL. THE STUDY WILL ALSO UTILIZE THE LIBERAL VERSUS CONSERVATIVE SCALE AS A COMPARISON OF POLITICAL IDEOLOGIES. I PLAN TO DESIGN AND DISTRIBUTE A SURVEY TARGETING THE PUBLIC'S BELIEFS ON HUMAN NATURE AND THEIR POLITICAL AFFILIATION. I PREDICT THAT THOSE WHO ARE LIBERAL WILL TEND TO BELIEVE HUMANS ARE MORE INHERENTLY GOOD AND THOSE WHO IDENTIFY WITH CONSERVATISM TEND TO BELIEVE HUMANS ARE MORE INHERENTLY BAD.

ARLETH FLORES APARICIO, PUBLIC POLICY MINOR IN LAW AND SOCIETY

FACULTY MENTOR(S): FRANCISCO PEDRAZA

FAMILY SEPARATION AT THE UNITED STATES SOUTHERN BORDER UNDER THE TRUMP ADMINISTRATION

FAMILY SEPARATION OCCURRED DURING THE 21ST CENTURY AFTER THE TRUMP ADMINISTRATION'S 2018 ZERO-TOLERANCE POLICY. UPON ARRIVAL TO THE SOUTHERN BORDER, IMMIGRANT FAMILIES WERE SEPARATED BY THE DEPARTMENT OF HOMELAND SECURITY. ADULTS WERE PLACED IN FEDERAL CRIMINAL FACILITIES WHERE CHILDREN ARE NOT ALLOWED. CHILDREN WERE SEPARATED FROM THEIR FAMILIES OR GUARDIANSHIPS, LEFT UNACCOMPANIED AND PLACED IN DETENTION CENTERS LEAVING THE CHILDREN WITH MENTAL ILLNESS AND PSYCHOLOGICAL LIFETIME ISSUES. THIS ARTICLE INTRODUCES THE HISTORY OF FAMILY SEPARATION IN THE UNITED STATES, INTERNATIONAL FAMILY SEPARATION POLICIES, AND A CRITICAL CASE *MRS. L VS. IMMIGRATION CUSTOMS ENFORCEMENT (ICE)* TO ANSWER THE FOLLOWING QUESTIONS: WHAT ARE THE CONSEQUENCES OF THE 2018 ZERO-TOLERANCE POLICY? WHAT IS THE FUTURE OF FAMILY SEPARATION POLICIES IN THE UNITED STATES? FURTHERMORE, THE TRUMP ADMINISTRATION AND VARIOUS ACTORS HAVE NOT BEEN HELD ACCOUNTABLE FOR THEIR ACTIONS COMMITTED AGAINST THESE FAMILIES, AND AFTER 5 YEARS, MANY FAMILIES HAVE NOT BEEN UNIFIED WITH THEIR CHILDREN. IT'S IMPERATIVE TO PROVIDE THESE FAMILIES WITH A FORM OF REPARATIONS TO OBTAIN TRUE JUSTICE FOR THE ACTIONS COMMITTED AGAINST THEM BY THE UNITED STATES GOVERNMENT.

AUDREY WILFONG, PUBLIC POLICY

FACULTY MENTOR(S): STEVEN BRINT

CLIMATE CHANGE EFFICACY ON THE UNIVERSITY OF CALIFORNIA, RIVERSIDE CAMPUS

THIS PAPER REVIEWS RECENT ATTEMPTS OF PROFESSORS AT THE UNIVERSITY OF CALIFORNIA, RIVERSIDE TO INCORPORATE LESSONS ABOUT CLIMATE CHANGE SCIENCE AND MITIGATION INTO THEIR CLASS CURRICULUM TO INCREASE THEIR STUDENTS' KNOWLEDGE ABOUT THE TOPIC. CLIMATE CHANGE HAS BECOME A MORE IMPORTANT ISSUE IN THE LAST FEW YEARS AS THE SCIENCE HAS BEEN STUDIED FURTHER, AND THE PUSH TO INTEGRATE EDUCATIONAL MATERIAL ABOUT IT IS UNDERWAY. THE UC SYSTEM HAS TAKEN ON INITIATIVES TO DIRECTLY COMBAT CLIMATE CHANGE'S EFFECTS, SUCH AS SETTING A GOAL TO PRODUCE ZERO-NET GREENHOUSE GAS EMISSIONS BY THE YEAR 2025, BUT THEY

ARE JUST BEGINNING TO EMPHASIZE CLIMATE CHANGE EDUCATION FOR THEIR STUDENTS. FOR MY RESEARCH, I WANT TO GAUGE PEOPLE'S CURRENT CLIMATE CHANGE EFFICACY ON UCR'S CAMPUS BY ADMINISTERING A SURVEY BEFORE AND AFTER STUDENTS TAKE A CLASS THAT HAS LESSONS ABOUT CLIMATE CHANGE. A SURVEY WITH BOTH SELECT AN ANSWER AND FILL IN THE BLANK QUESTIONS WILL TEST STUDENTS' INITIAL KNOWLEDGE ABOUT CLIMATE CHANGE. AFTER TAKING THE CLASS WITH THE CLIMATE CHANGE LESSON, STUDENTS' ANSWERS SHOULD BECOME MORE ACCURATE AND PRECISE BASED ON THE NEW INFORMATION THEY HAVE ATTAINED. A WIDE VARIETY OF PEOPLE FROM DIFFERENT MAJORS AND CLASS STANDINGS WILL HAVE THE OPPORTUNITY TO FILL OUT THIS SURVEY, SINCE IT WILL BE ADMINISTERED TWO TIMES PER CLASS OVER A SPAN OF THREE QUARTERS. THIS PAPER SEEKS TO ANSWER THE QUESTION: DO STUDENTS HAVE A BETTER UNDERSTANDING OF THE SCIENCE BEHIND CLIMATE CHANGE AFTER TAKING A CLASS WITH A LESSON OR LESSONS ABOUT THE TOPIC?

Thank you to the campus community who make the symposium a great success each year!

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