Welcome!

Cuesta College Faculty Lecture Series Presents:

Faculty Innovators Providing Undergraduate Research Opportunities

Tuesday, November 10th

5:00pm-6:30pm

This work is supported by the National Science Foundation under Grant No. 1821351

Agenda

Event Overview
Faculty Lecture Series Overview
Welcome from Cuesta College's Vice President of Instruction
Importance of Undergraduate Research
Building a STEM Community at Cuesta College
Student Research Highlights & Faculty Innovator Presentations
Questions and Answers with Faculty Innovators

CUESTA COLLEGE

Faculty Lecture Series Overview

Dr. Lara Baxley;
Cuesta College Chemistry Faculty

CUESTA COLLEGE

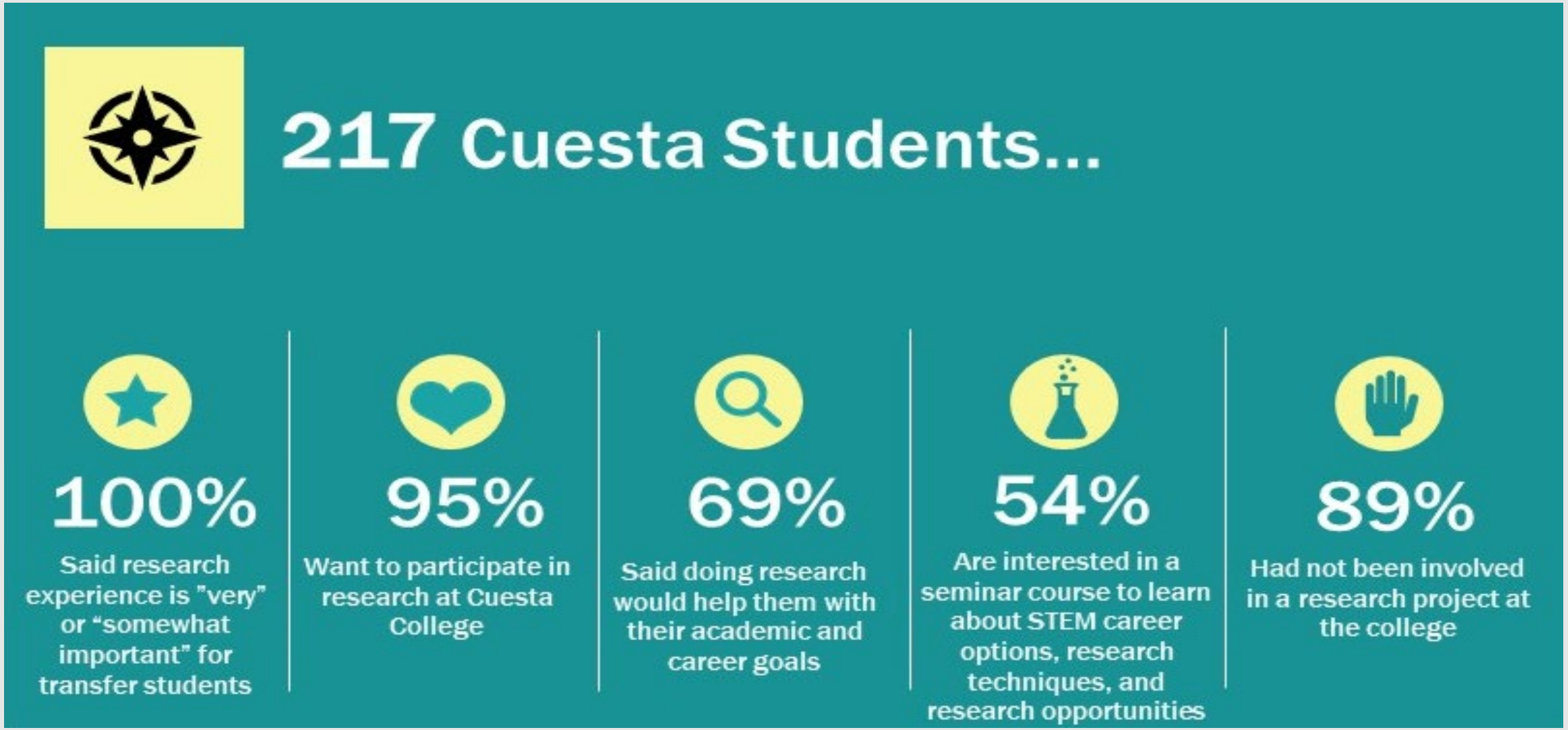
Welcome

Dr. Jason Curtis;
Cuesta College Vice President of Instruction
NSF IUSE Project Administrator

Importance of Undergraduate Research at Cuesta College

https://www.youtube.com/watch?v=Q2D7UlsDEzQ&t=767s

2020 Student Focus Groups
Result Summary



BIO 295 Undergraduate STEM Seminar (Fall 2021)

- Interdisciplinary Seminar
- Explore academic and career opportunities
- Engage with community STEM partners
- Develop professional and personal skills for success in STEM
- Build student confidence to succeed in STEM
- Create a STEM community on campus

Introductions of the Cuesta College Faculty Innovators

Laurie McConnico	Biology Faculty
Silvio Favoreto	Biology Faculty
Feride Schroeder	Physical Sciences Faculty
Guillermo Alvarez Pardo	Mathematics Faculty
Jeff Jones	Engineering Faculty
Eltahry Elghandour	Engineering Faculty
Lise Mifsud	Anthropology Faculty

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Biological Sciences

Laurie McConnico
Silvio Favoreto

Biological Sciences

Dr. Laurie McConnico

Background

- PhD Marine and Coastal Science
- MS Marine Science
- BS Biology

Research Areas

- Marine Ecology, Phycology, Environmental Microbiology

Full Time Faculty at Cuesta College

- Marine Biology, Biology, Environmental and Applied Microbiology, Marine Biology in Baja, Field Studies 209C & S

Project and Research-Based Biology Classes

- **Bio 201** Biology (for majors)
- **Bio 209 (C,D,S)** Field Studies
- **Bio 210M** Environmental & Applied Microbiology
- **Bio 222/222L** Marine Biology in Baja, Mexico
- **Bio 242** Biology Research Assistant
- **Bio 247** Independent Study: Biology

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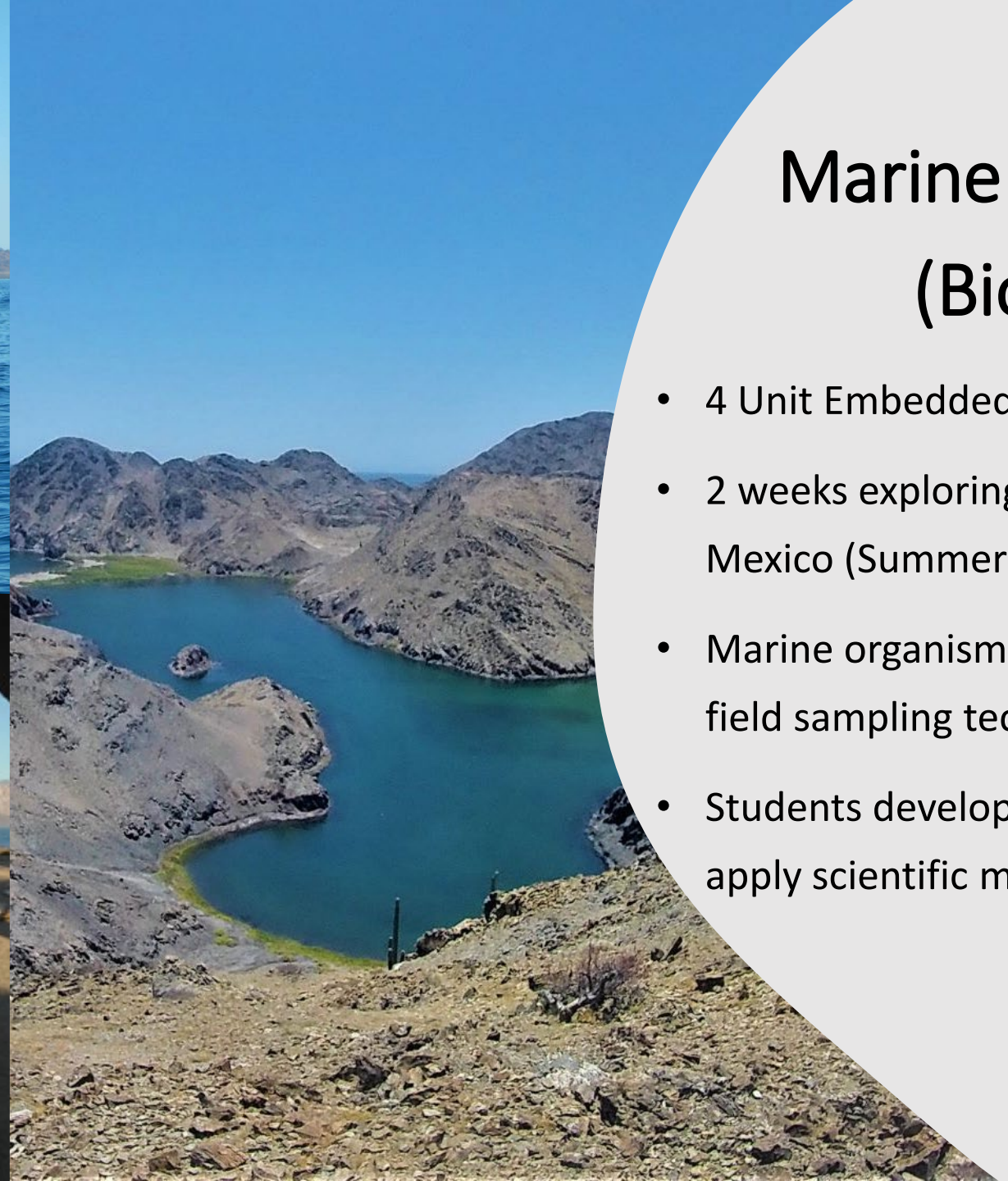

Marine Biology in Baja (Bio 222/22L)

- 4 Unit Embedded Research Experience
- 2 weeks exploring & studying Baja, Mexico (Summer)
- Marine organisms, habitats and field sampling techniques
- Students develop research projects and apply scientific method

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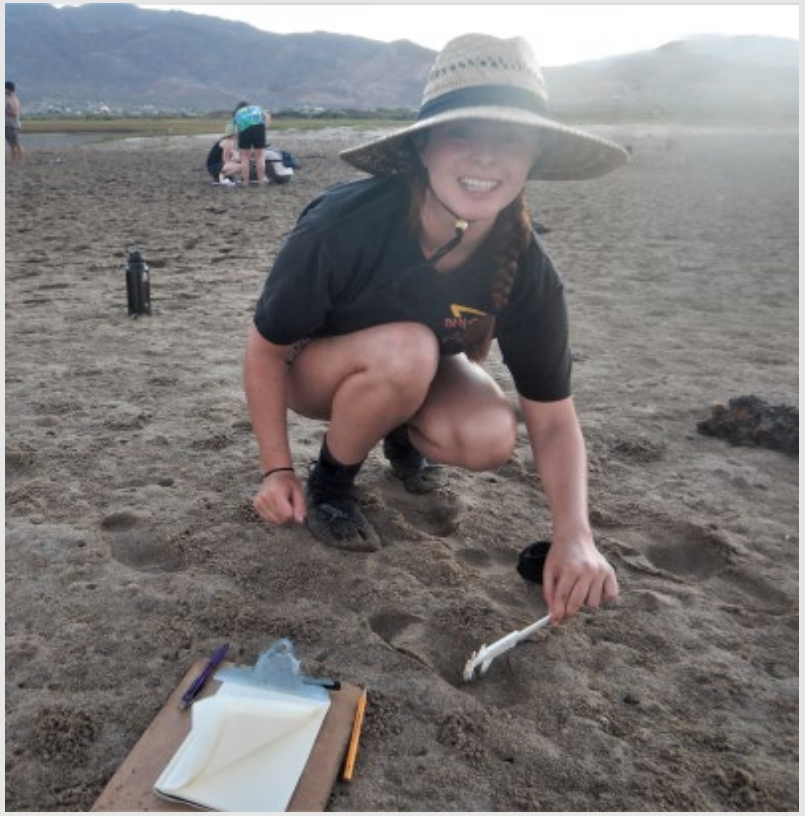

Baja Research Projects

Biological Sciences

Dr. Silvio Favoreto Jr.

Background

- PhD Microbiology
- Masters Public Health
- DDS

Research Areas

- Microbiology, Immunology, Environmental Microbiology

Full Time Faculty at Cuesta College

- Microbiology, Environmental and Applied Microbiology, Marine Biology in Baja

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Environmental and Applied Microbiology (Bio 210M)

- 2 Unit Research Course (Summer)
- Marine ecology and environmental microbiology
- Practice lab and field techniques
- Collect and analyze data on eelgrass wasting disease
- Contributing to long-term data set

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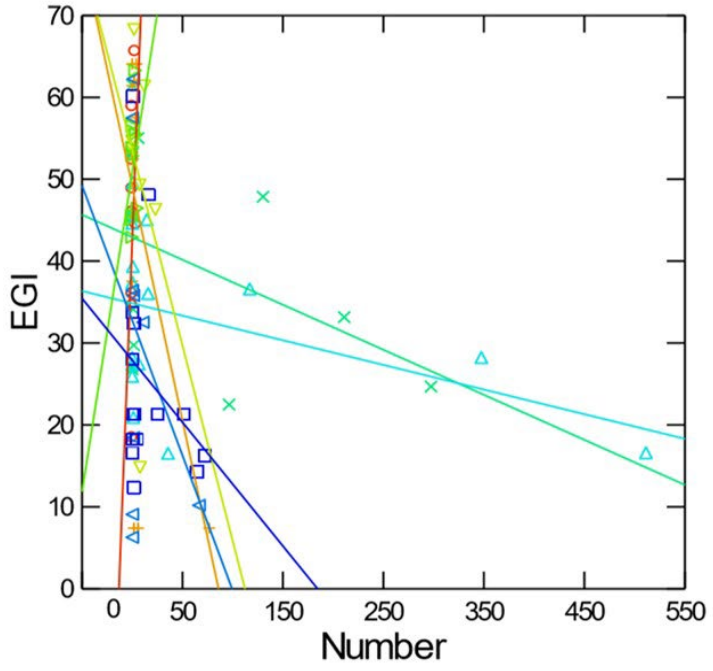
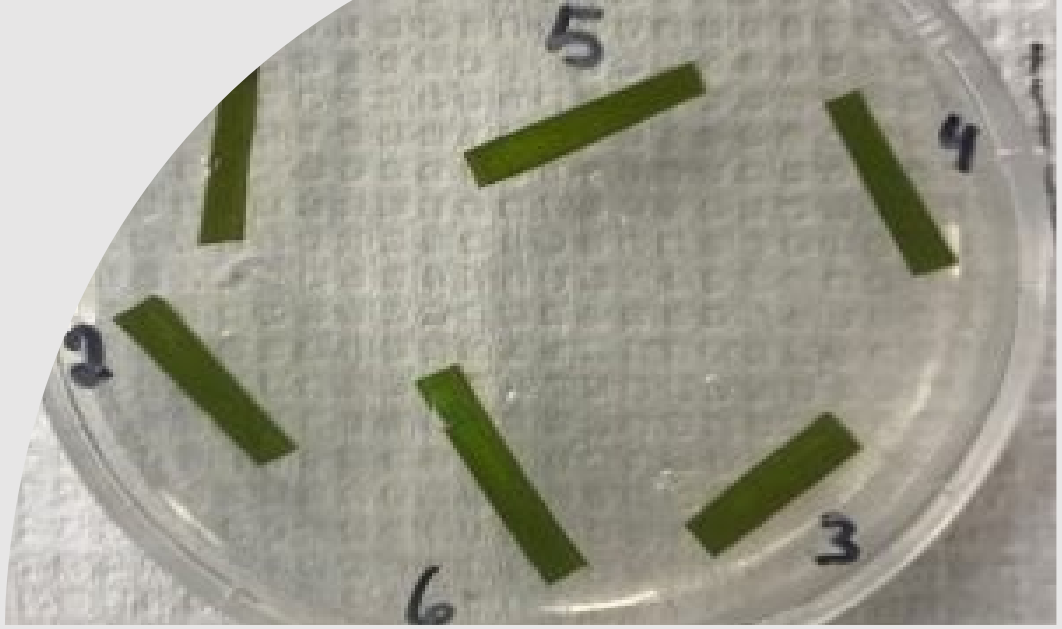
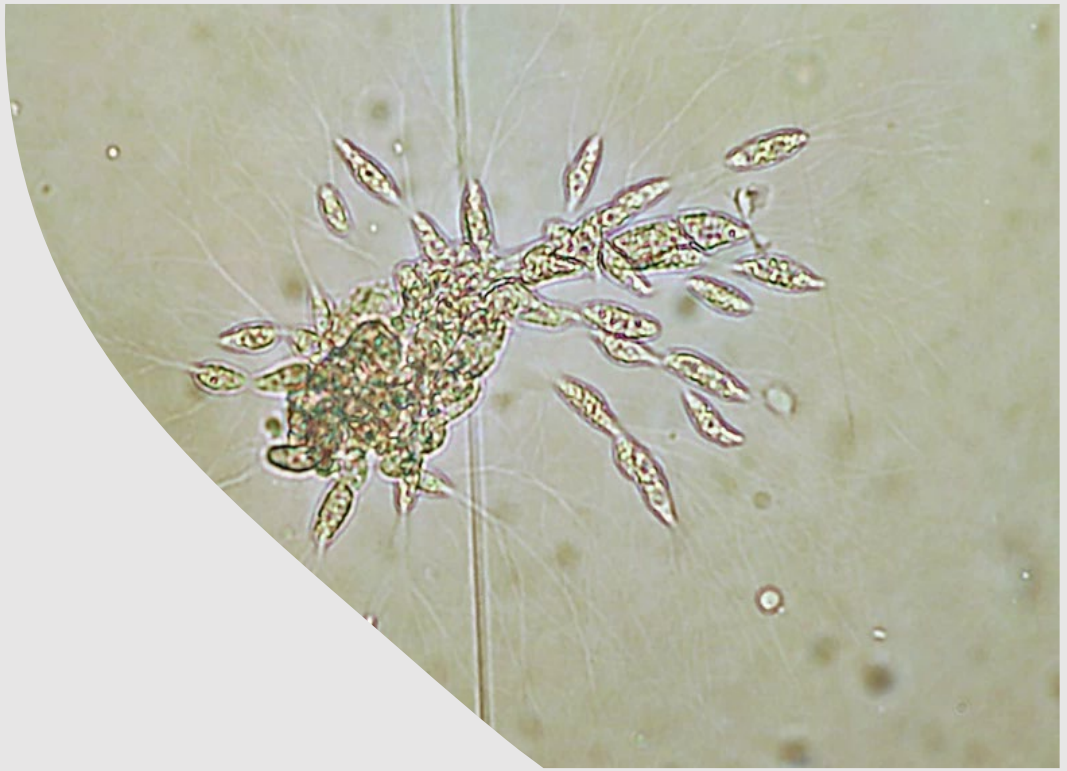
Eelgrass Research







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Students Present at International Conferences

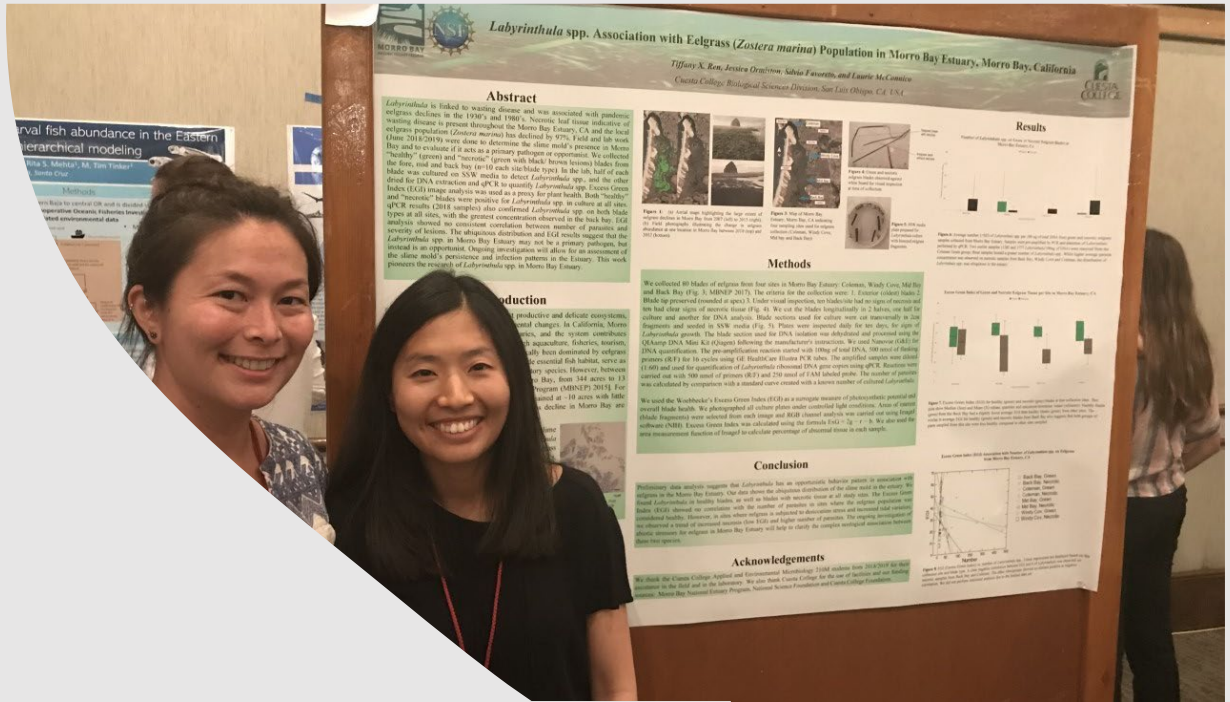
Write Blogs

Develop Community Partnerships

Guest author, Dauphiene Parks.

CUESTA COLLEGE DIVES IN TO HELP STUDY EELGRASS DEC
MORRO BAY

September 20, 2019 Posted by Morro Bay National Estuary Program cal p
college Dauphiene Parks eelgrass estuary program field work genetic testing labyrinth
McConnico MBNEP microbiology morro bay morro bay national estuary program rese
study science students Silvio Favoreto slime mold Field Updates Guest post



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Physical Sciences

Feride Schroeder

Physical Sciences Faculty Introduction

Dr. Feride Schroeder

Background

- B.S. Conservation and Resource Studies (UC Berkeley)
- M.A. Geography: Resource Management and Environmental Planning (SF State University)
- PhD Geology (McMaster University)

Research Areas

- Geospatial Science and Earth Sciences

Roles at Cuesta College

- Part-time faculty in Earth and Ocean Sciences
- Geographic Information Systems (GIS) Program Administrator

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Project and research-based classes

- Introduction to Geographic Information Systems (GIS)
- Advanced GIS
- Web Applications in GIS
- Data Acquisition and Management in GIS
- Remote Sensing

- Oceanography
- Oceanography Lab

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Engaging Cuesta College Students in Physical Sciences Research

Oceanography Field Work

- Water quality sampling – measuring salinity, dissolved oxygen and nutrients in coastal waters
- Beach profiles – examining impacts of coastal processes on shorelines

CUESTA COLLEGE

Engaging Cuesta College Students in Physical Sciences Research

2011 San Luis Obispo County Board of Supervisor Redistricting

Impacts of Proposed Alternatives on Dominant Political Party in Each District

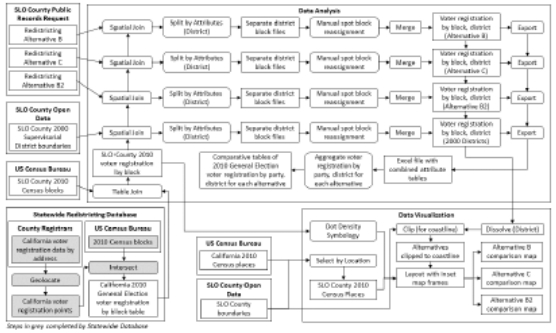
by Thomas Arndt

Introduction

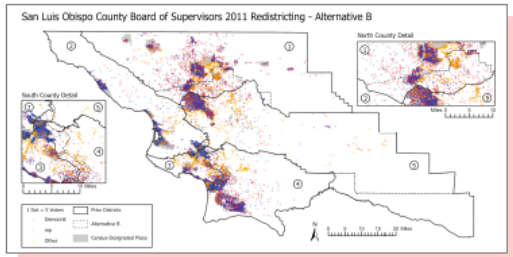
Every ten years, counties in California are required to adjust their supervisorial district boundaries to account for population changes as determined by the federal Census (California Elections Code 1994). Following the 2010 Census, in 2011 the San Luis Obispo County Board of Supervisors considered three final redistricting options developed by County staff to satisfy equal population requirements, and ultimately voted to approve the current district boundaries from this list (Board of Supervisors 2011b). While state law prohibits supervisors from making redistricting decisions to favor a particular political party (California Elections Code 1994), the impact of each reapportionment option on the dominant political party in each district would have been important to the Supervisors, both within their own districts and for the Board as a whole. In the first Supervisorial election following the 2011 redistricting, liberal-leaning Supervisor Patterson lost the District 5 seat to conservative-leaning Supervisor Arnold, shifting the Board ideological majority from liberal to conservative. By moving voters between districts, the 2011 redistricting process may have contributed to this ideological shift. This study uses spatial analysis to examine the potential impact of each 2011 redistricting option on the dominant political party in each district, and on the Board as a whole.

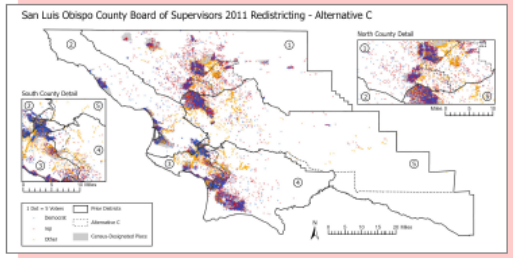
Methods

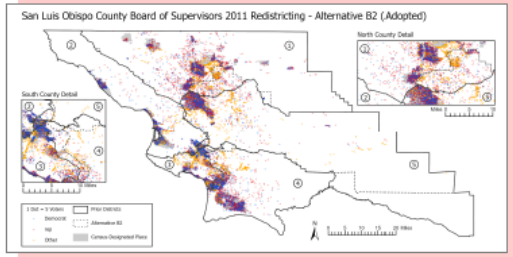
Census blocks (US Census Bureau 2011) with voter registration data (Statewide Database 2011) were grouped according to redistricting Alternatives B, C, and B2 developed by the County (Savage 2020) and compared to the boundaries prior to redistricting (County of San Luis Obispo 2020) to determine the partisan movement of voters under each option.



Alternative Maps







Results/Conclusion

The similarities in voter apportionment by political party among the three options suggest that partisan affiliation was not a substantial factor in the redistricting decision. While there were partisan implications of all redistricting alternatives, namely the increase in Republican voter margin in District 5, none of the proposed alternatives shifted the dominant party on the Board as a whole, nor within any individual district. In fact, based on voter registration alone, Republicans were the dominant political party for the County as a whole, both before redistricting and under each alternative proposed. This is seemingly at odds with the Board composition at the time, with liberal-leaning Supervisor Patterson representing Republican-dominated District 5. However, the resulting datasets carry limitations in interpretation and real-world application. These methods do not capture voter behavior, which in practice varies from voter registration. Not all registered voters cast ballots in every election for every contest, and those that do are not beholden to allegiance towards their registration party. Furthermore, a large portion of San Luis Obispo County voters are either nonpartisan by registration or belong to a minor political party, and the significance of moving such voters is more difficult to assess.

Despite the observed ideological shift on the San Luis Obispo County Board of Supervisors following the 2011 redistricting decision, the new district boundaries did not appear to substantially alter the partisan makeup of any one district, nor the Board as a whole. However, the methods developed in this study can be applied to evaluate future redistricting alternatives proposed in California, provided the Statewide Database is updated with concurrent data. The next redistricting process for San Luis Obispo County will take place in 2021, following the completion of the 2020 Census (California Elections Code 1994). Using

GIS Projects

- Political Science
- Transportation
- Geology
- Forestry/Natural Resources
- Archaeology
- Criminal Justice
- Water Resource Management
- Business

Top 10 Worst Traffic Intersections In Bakersfield, California By Year 2016 to 2019

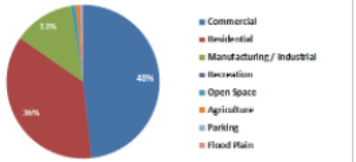
Geology 230 Final Project

About This Map

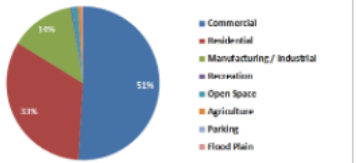
This map displays the the top 10 worst traffic intersection in the City of Bakersfield from 2016 to 2019. Intersection rankings were determined by how many accidents occurred in or around the traffic intersection. Click on the layer list to turn on or off the data layers by year. Data is from the Transportation Injury Mapping System (TIMS) as well as the Bakersfield City GIS Department.

In addition to performing a spatial analysis to identify the traffic intersections where the most collisions occurred, an analysis to determine the most associated land uses with collisions by year was performed. Associated land uses were identified by finding what zones accidents fell in by buffering the city's zoning shapefile. The analysis time frame was from 2016 to 2019 and data for each year can be seen in the pie charts below.

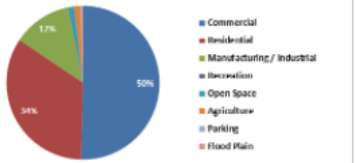
2019 Collisions by Associated Land Use Type



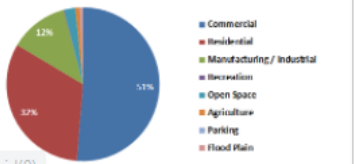
2018 Collisions by Associated Land Use Type



2017 Collisions by Associated Land Use Type



2016 Collisions by Associated Land Use Type



Find address or place

Rosedale Hwy

Taft Hwy

Buena Vista Aquatic Recreation Area

Enos Ln

Bakersfield

2mi

Student: Daniel Audelo

Legend

Bakersfield City Limits

2016 Worst Intersections

2017 Worst Intersections

2018 Worst Intersections

2019 Worst Intersections

City of Bakersfield Zoning

- Residential
- Commercial
- Manufacturing / Industrial
- Open Space
- Agriculture
- Flood Plain
- Parking
- Drilling Island
- Recreation
- Special Use
- Other

Archaeological Investigations and Resources within the Pismo Coast

Kelli Wathen

INTRODUCTION

The Pismo Coast of California has a rich prehistoric past that has yet to be collated into one resource. Most of the archaeological studies have been performed in small areas due to the highly developed land and property boundaries. For this reason, studies on a large scale are not likely possible. However, the indigenous people living on this land for thousands of years prior to European contact did not conform to these same boundaries and the remains of their lives and communities are scattered throughout the coastal area. In order to get a better picture of the Pismo Coast's archaeological resources, this study examines the amount of the Pismo Coast that has been investigated, and faunal resources from two sites in the coastal study area.

METHODOLOGY

The Pismo Coastline was digitized from topographic basemaps. A 1.5 kilometer buffer was created to it to signify the Study Area. All archaeological investigations were digitized and merged, and the area was calculated. Due to the large amount of investigations, only two sites were chosen to be studied further. These were chosen due to the vast amount of archaeological data and the integrity of the company who ran the investigation. Data from those reports were entered into attribute tables in order to create the chart symbology seen in Figures 2 and 3.

RESULTS

The Pismo Coastline used in this study is 12.8 km long and the 1.5 km buffer created, when halved (due to half consisting of water) is 17.5 km^2 of land. The merged investigations make up 6.6 km^2, meaning 37.7% of the Study Area has been investigated (Figure 1). Both Site A and Site B had a large assemblage of artifacts and faunal resources with equivalent artifact classes and faunal classes as well as comparable counts of artifacts.

Fig 1. Archaeological Investigations in Study Area

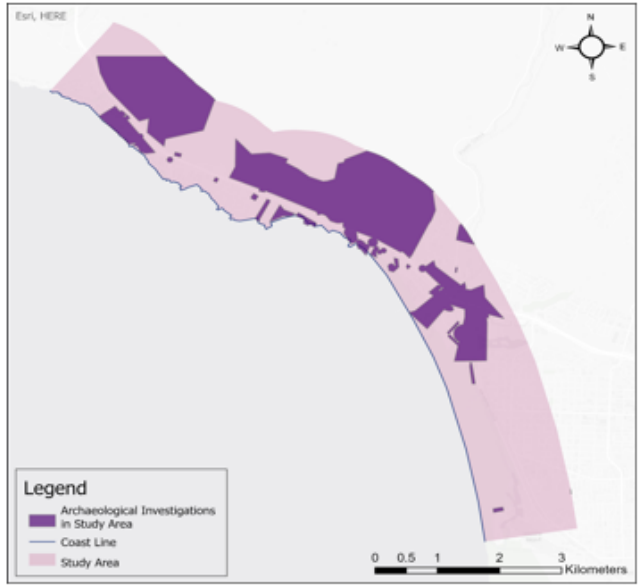


Fig 2. Faunal Assemblages at Sites A and B

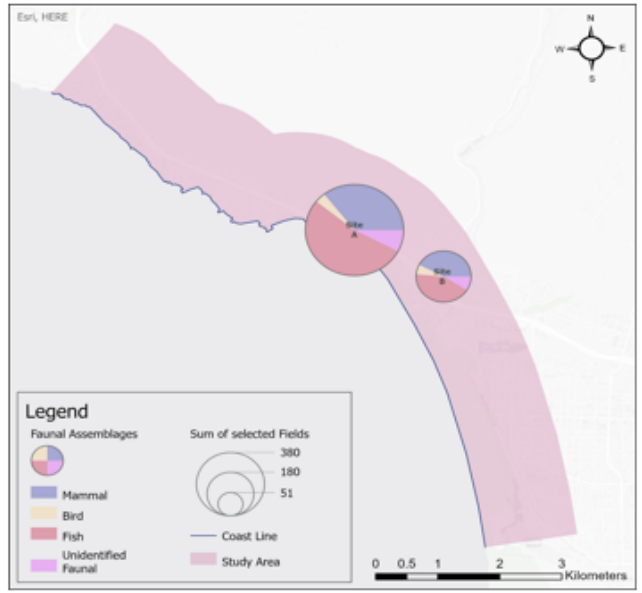
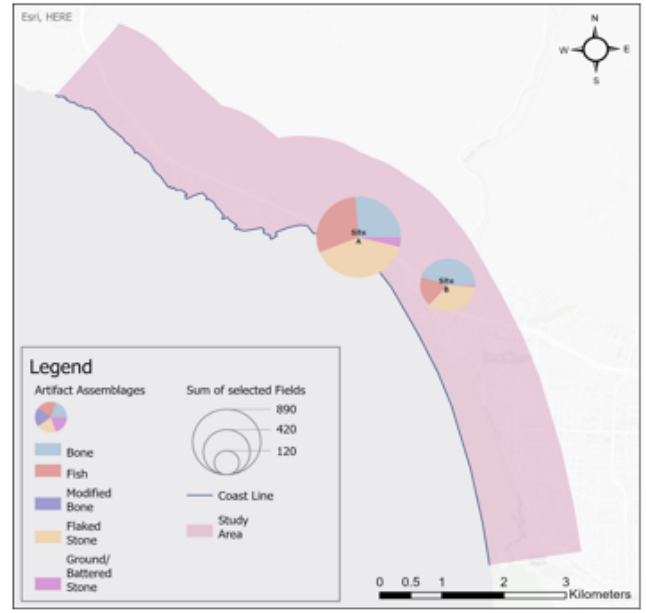
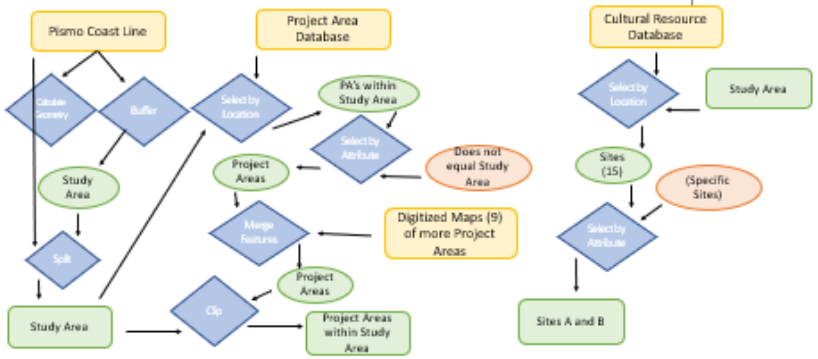


Fig. 3 Artifact Assemblages at Sites A and B



WORKFLOW



CONCLUSIONS

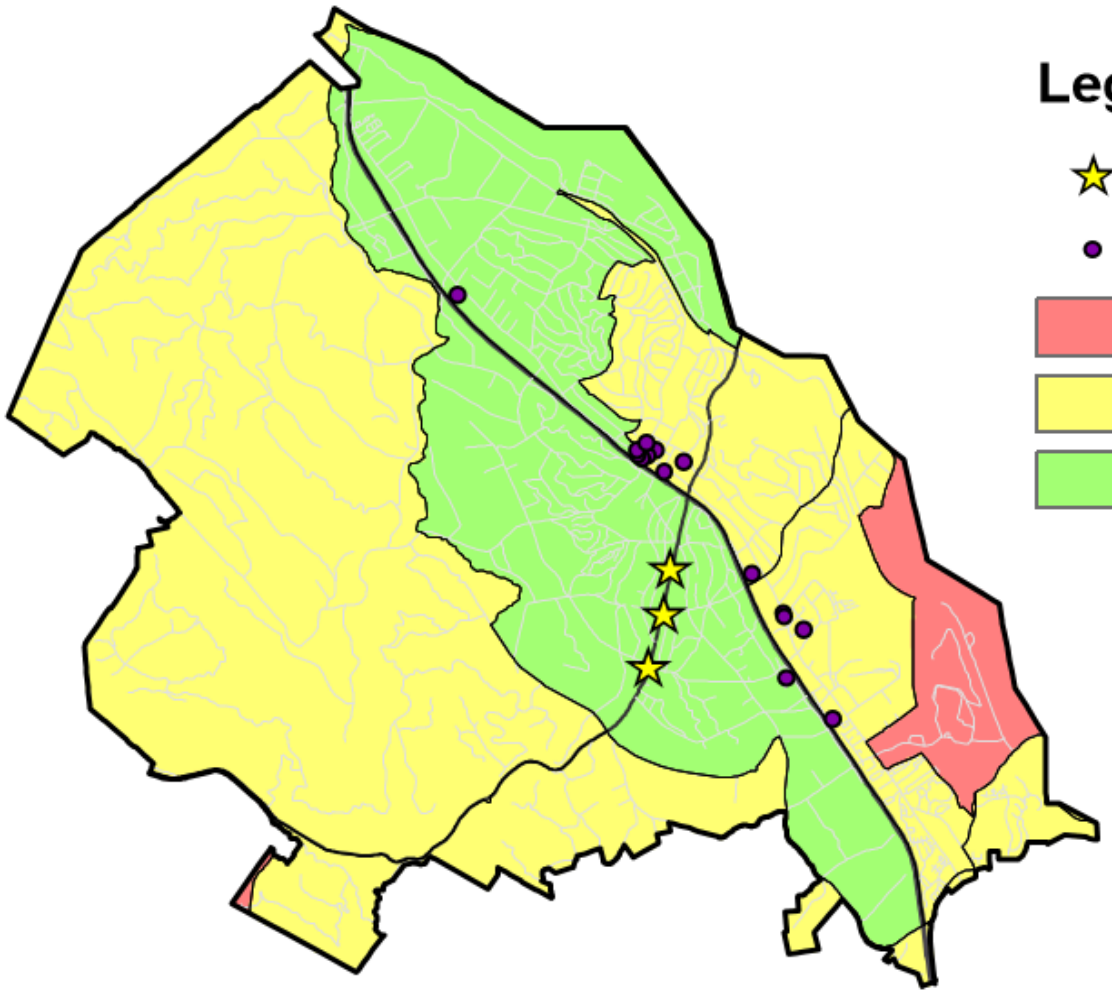
Archaeological investigations in the Pismo Coast Study Area consists of 37.7% of land, which is a large percentage compared to other areas throughout California. Sites A and B had comparable assemblages of artifacts and faunal, with Site A containing nearly twice as large of a collection. This may be due to Site A being in a location that is less disturbed and Site B being in a more developed area. Fish and faunal bone make up most of the assemblages at both sites. This indicates hunting was actively practiced at these sites and they may also have been used as areas of habitation (Jones and Mikkelsen 2009; Jones, Mikkelsen, and Meyer 2012). The large percentage of fish remains is not surprising due to the proximity from the ocean. Future research will be done to analyze more sites in the Study Area and develop a better understanding of archaeology in the Pismo Coast.

REFERENCES

Jones, Deborah and Patricia Mikkelsen
2009 Archaeological Test Excavations at [redacted] for the [redacted] in Pismo Beach, San Luis Obispo County, California. Far Western Anthropological Research Group, Inc. Davis, California. Submitted to Carol Florence, Oasis Associates, Inc. San Luis Obispo, California.

Jones, Deborah, Patricia Mikkelsen, and Jack Meyer
2012 Archaeological Study for Inadvertent Impacts to Sites [redacted], [redacted], and [redacted] for Operational Improvements along [redacted], Pismo Beach, San Luis Obispo County, California. Far Western Anthropological Research Group, Inc. Davis, California. Submitted to Caltrans District 5, San Luis Obispo, California.

Ideal Locations for British Pub



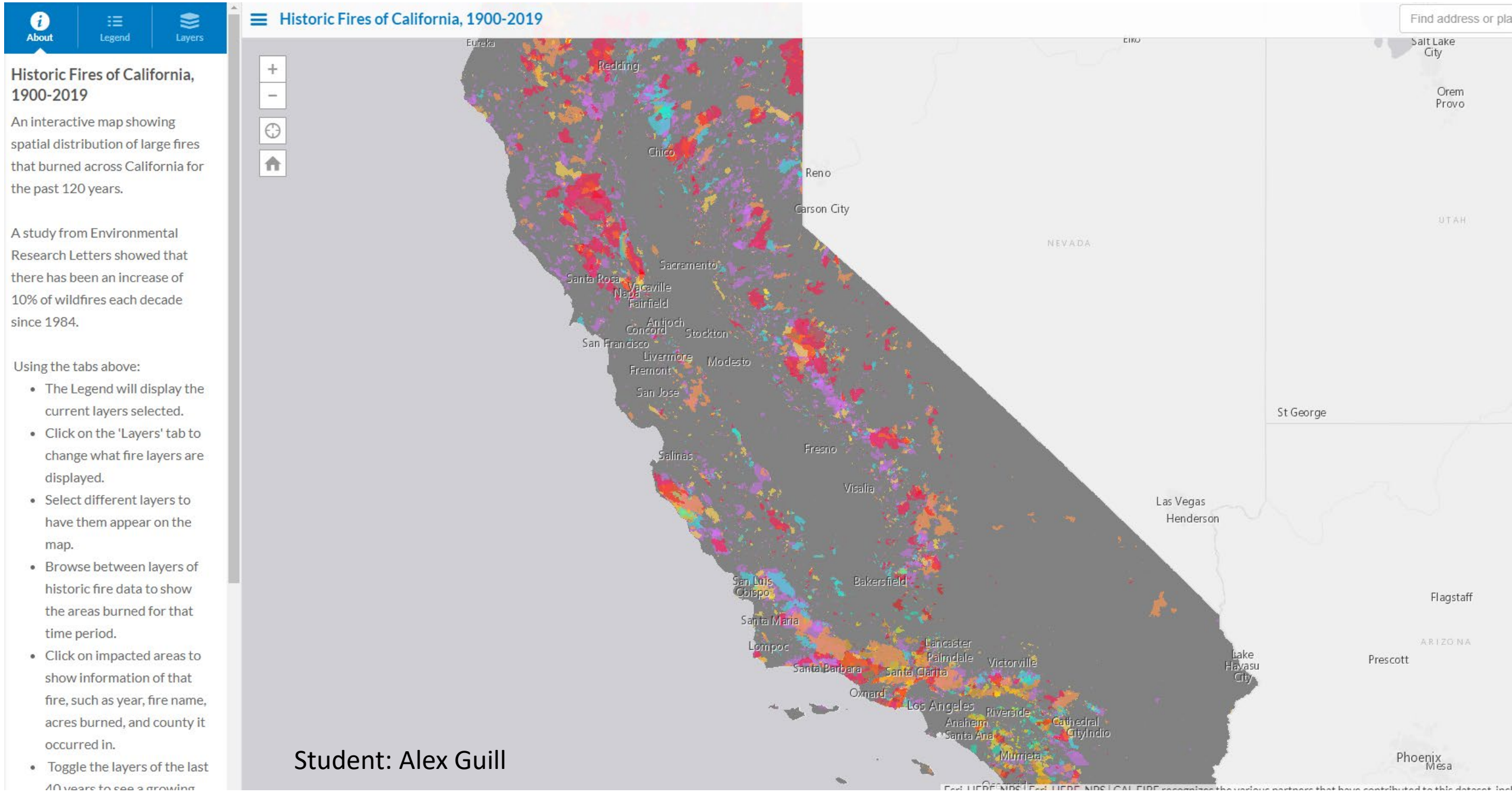
Legend

- Ideal Locations for Pub
- Atascadero Bars
- Least Favorable Location
- Favorable Location
- Most Favorable Location

0 0.5 1 2 Miles

N

Weighted Anaylsis built out in ArcMap showing current Atascadero bars, and my chosen three locations for a potential British pub.


About
Legend
Layers
Historic Fires of California, 1900-2019
Historic Fires of California, 1900-2019
An interactive map showing spatial distribution of large fires that burned across California for the past 120 years.
A study from Environmental Research Letters showed that there has been an increase of 10% of wildfires each decade since 1984.
Using the tabs above:
The Legend will display the current layers selected.
Click on the 'Layers' tab to change what fire layers are displayed.
Select different layers to have them appear on the map.
Browse between layers of historic fire data to show the areas burned for that time period.
Click on impacted areas to show information of that fire, such as year, fire name, acres burned, and county it occurred in.
Toggle the layers of the last
Find address or pla
Eureka
Redding
Chico
Reno
Carson City
NEVADA
UTAH
Salt Lake City
Orem
Provo
Sacramento
Santa Rosa
Vacaville
Napa
Fairfield
Antioch
Concord
Stockton
San Francisco
Livermore
Modesto
Fremont
San Jose
Salinas
Fresno
Visalia
Las Vegas
Henderson
St George
San Luis Obispo
Bakersfield
Santa Maria
Lompoc
Lancaster
Palmdale
Victorville
Santa Barbara
Santa Clarita
Oxnard
Los Angeles
Riverside
Anaheim
Santa Ana
Cathedral City
Indio
Murrieta
Lake Havasu City
Flagstaff
ARIZONA
Prescott
Phoenix
Mesa
Student: Alex Guill

CUESTA COLLEGE

Mathematics

Guillermo Alvarez Pardo

Mathematics
Faculty Introduction

Guillermo Alvarez Pardo

Background

- B.S. Mathematics (Complutense University of Madrid, Spain)
- M.A. Mathematics (The University of Manchester, United Kingdom)
- MBA with Specialty in Finance (Monterrey Institute of Technology and Higher Education, Mexico)
- M.A. Audiovisual Communication (Charles III University of Madrid, Spain)

Research Areas

- Distance Education
- Digital Technologies and AI for Education.

Roles at Cuesta College

- Full-Time Math Professor with emphasis in Statistics.
- Institutional Effectiveness Committee member.

Engaging Cuesta College Students in Mathematics Research

Development of *Math 290: Introduction to Research*.

- Research about similar courses taught at other colleges or universities.
- Research about similar courses taught at Cuesta College.
- Research on transferability and articulation.
- Elaboration of a Course Outline of Record (COR).
- Registration at Curricunet and Submission to the Curriculum Committee.

Thanks to the work and collaboration of:

- Thea Labrenz (Articulation Officer)
- Denise Chellsen (Math Department Chair)
- Robert Schwennicke (Math Professor)
- Jennifer Sanders-Moreno (Math Professor)
- Matt Knudsen (Math Rep. at Curriculum Committee)

COR in Curricunet

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Course Student Learning Outcomes Report

MATH 290 INTRODUCTION TO RESEARCH

Student Learning Outcomes

1. Examine and research problems in mathematics or statistics.
2. Express in writing the findings from their research and find opportunities for publication.

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SLOs in Curricunet

Catalog Description:
Introduces students to the fundamentals of mathematical research, including reading journal articles and working on open problems in mathematics. Includes instruction on writing up research results using an industry standard typesetting program, such as LaTeX, and finding opportunities to have original work published or disseminated.

Schedule Description:
Introduces students to the fundamentals of mathematical research, including reading journal articles and working on open problems in mathematics. Prerequisite: MATH 247, MATH 283 or MATH 287. Or concurrent enrollment in MATH 287. Transfer: CSU.

Engaging Cuesta College Students in Mathematics Research

Finding open problems for students to research

- Problems in *The College Mathematics Journal* and *The American Mathematical Monthly* by the Mathematical Association of America.
- Other sources of problems, like the *MathAMATYC Educator*.
- Problems provided by companies and institutions according to the PIC Math Methodology (NSF and NSA sponsored).

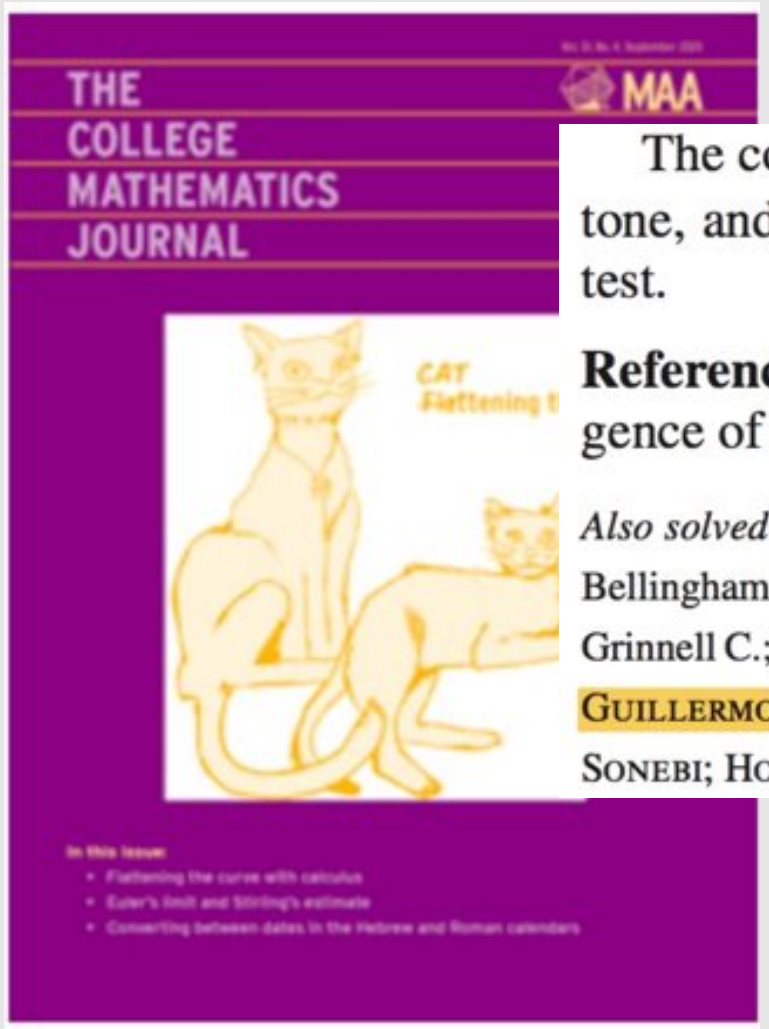
Finding paths to publication:

- Problems in *The College Mathematics Journal* and *The American Mathematical Monthly* by the Mathematical Association of America and other journals.

Thanks to the work and collaboration of:

- Robert Schwennicke

Paths to Publication



The condition $\frac{x_{n+1}}{x_n} \to 1$ as $n \to \infty$ implies that sequence $(x_n)_{n\geq 1}$ is weakly monotone, and by the reference below, this is sufficient to apply the Cauchy condensation test.

Reference: Liflyand, E., Tikhonov, S., Zeltser, M. (2011). Extending tests for convergence of number series. *J. Math. Anal. Appl.* 377: 194–206.

Also solved by PAUL BRACKEN, U. of Texas, Edinburg; ROBERT DOUCETTE, McNeese St. U.; JAMES DUEMMEL, Bellingham, WA; DMITRY FLEISCHMAN, Santa Monica, CA; RUSS GORDON, Whitman C.; EUGENE HERMAN, Grinnell C.; THE IOWA STATE UNDERGRADUATE PROBLEM SOLVING GROUP; ELIAS LAMPAKIS, Kiparissia, Greece; GUILLERMO ALVAREZ PARDO and ROBERT SCHWENNICKE, Cuesta C.; JOEL SCHLOSBERG, Bayside, NY; OMAR SONEBI; HONG BIAO ZENG, FORT HAYS ST. U.; AND THE PROPOSER.

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Journal homepage: https://maa.tandfonline.com/loi/ucmj20

CUESTA COLLEGE

Engineering

Jeff Jones
Eltahry Elghandour

Engineering
Faculty Introduction

Jeff Jones
Eltahry "Tahry" Elghandour

- **Engineering Design**
- **Getting Students Excited About Engineering**

Engineering Research at Cuesta College

ENGR248- Introduction to Engineering

2 units

Engaging Cuesta College Students in Engineering Research

Outline of the presentation:

- *General Laboratory Safe Practice Procedures*
- Lab Clean-up Instructions
- Spaghetti Design Challenge Lab
- Engine Disassembly and Assemble Lab
- Mechatronics Understanding and Using Microcontrollers Lab
- Concrete Design and Build a Beam

Engaging Cuesta College Students in Engineering Research

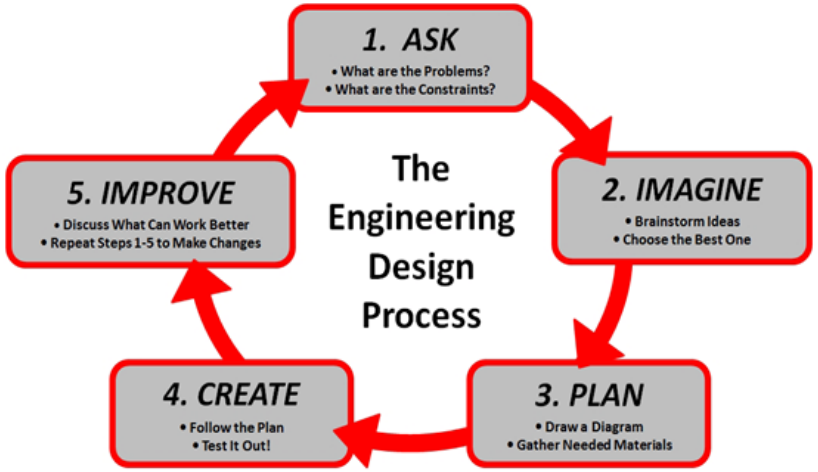
Project#1	Description	Status	Expected Completion
1	Safety	Complete	Done
2	Clean-up	Complete	Done
3	Spaghetti bridge design project	Complete	Done
4	Spaghetti beam truss design challenge project	Complete	3/1/2021
5	Engine (Disassembly and assembly)	in progress	3/1/2021
6	Assembling the Boe-Bot Robot 1o units.	Complete	done
7	Procedure to install Basic Stamp Software	Complete	done
8	Write your first program Activity.	Complete	done
9	Testing Speed Control with the Debug Terminal.	Complete	done
10	Calculating distances activity.	in progress	1/1/2021
11	Building and Testing the Whiskers	in progress	1/1/2021
12	Testing the Frequency Sweep.	in progress	2/1/2021
13	Following a Stripe.	in progress	2/1/2021
14	Concrete design and build a beam	in progress	3/15/2021
15	Drill Dissect (Disassembly and assembly)	in progress	3/15/2021

Engaging Cuesta College Students in Engineering Research

4- Spaghetti Design Challenge Lab

- **Objective:** Students are to work in groups to design and build a structure made entirely from pieces of uncooked spaghetti connected by masking tape. The objective of your structure is to suspend a penny as far from the edge of your fixed end of the structure.

- **The Engineering Design Process:** Your team will use the engineering design process below to design, build, and test your structure.

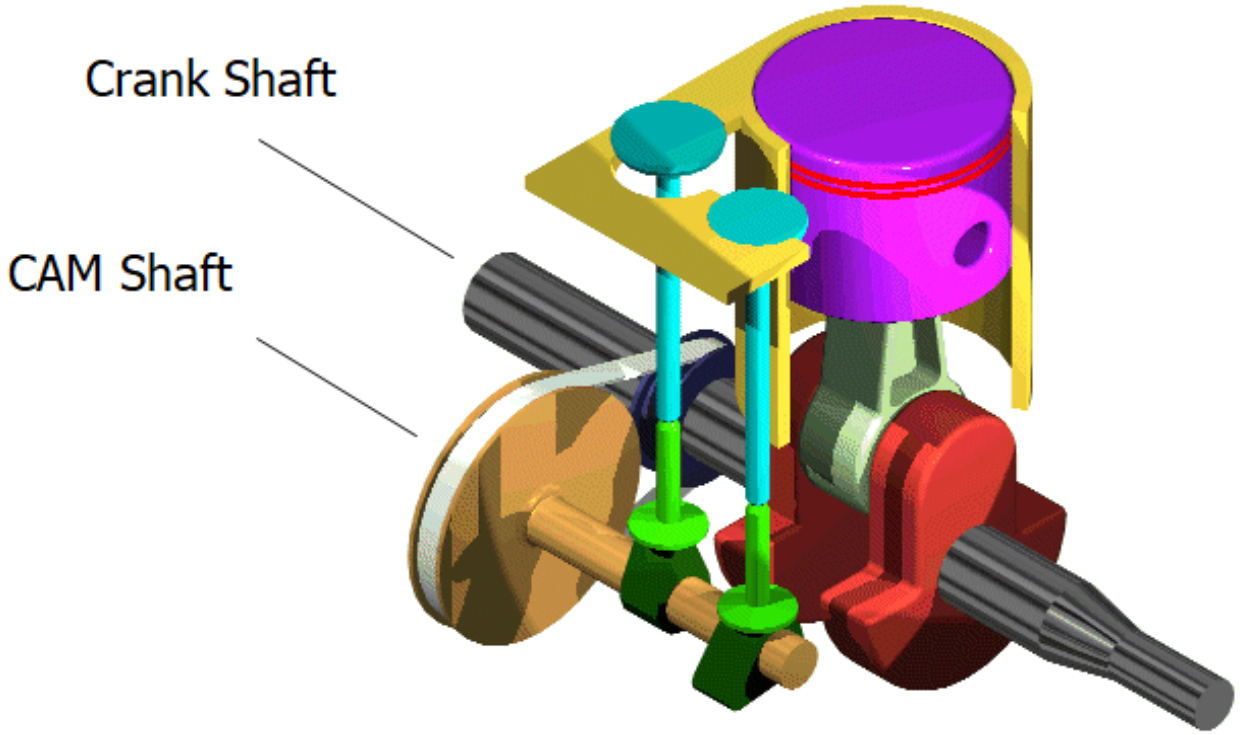


Competition

Engines

Engine converts Chemical energy into mechanical work

Basic Concepts



CAMS are driven by the CRANK SHAFT
using GEARS or BELTS to control TIMING

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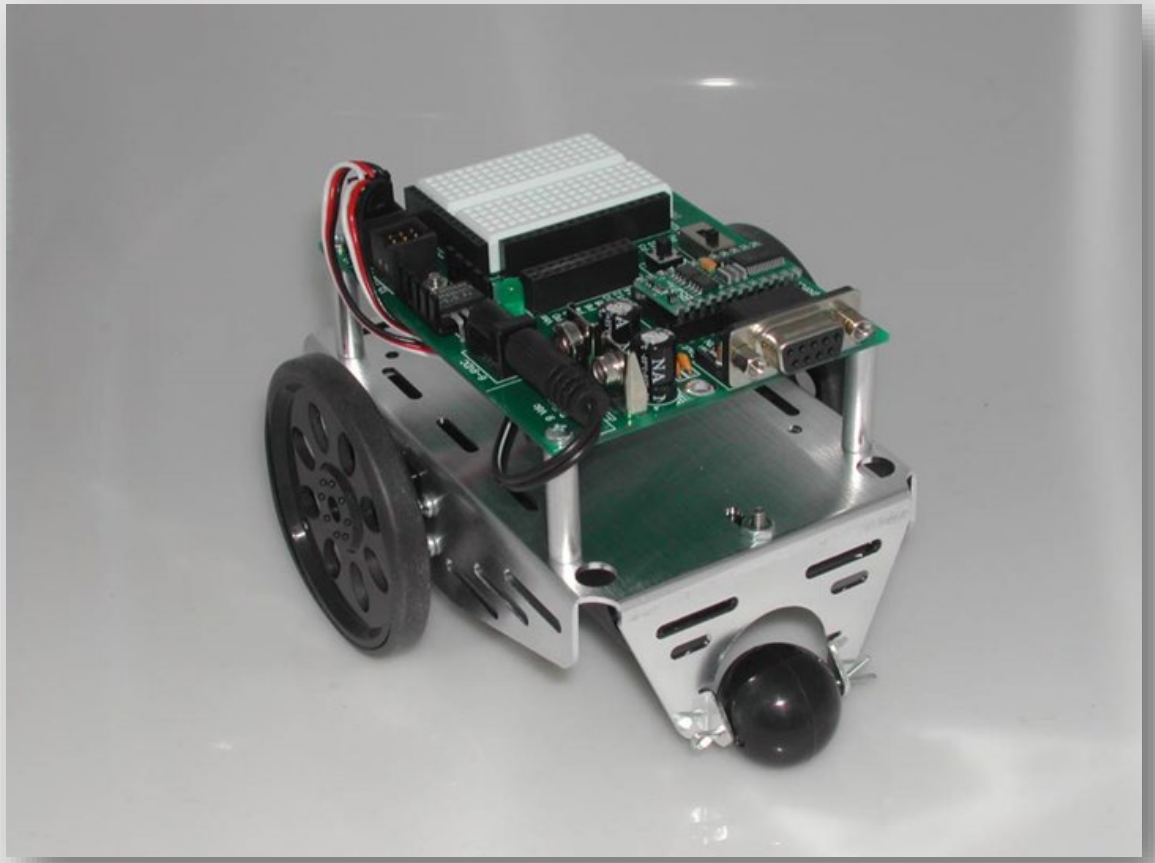
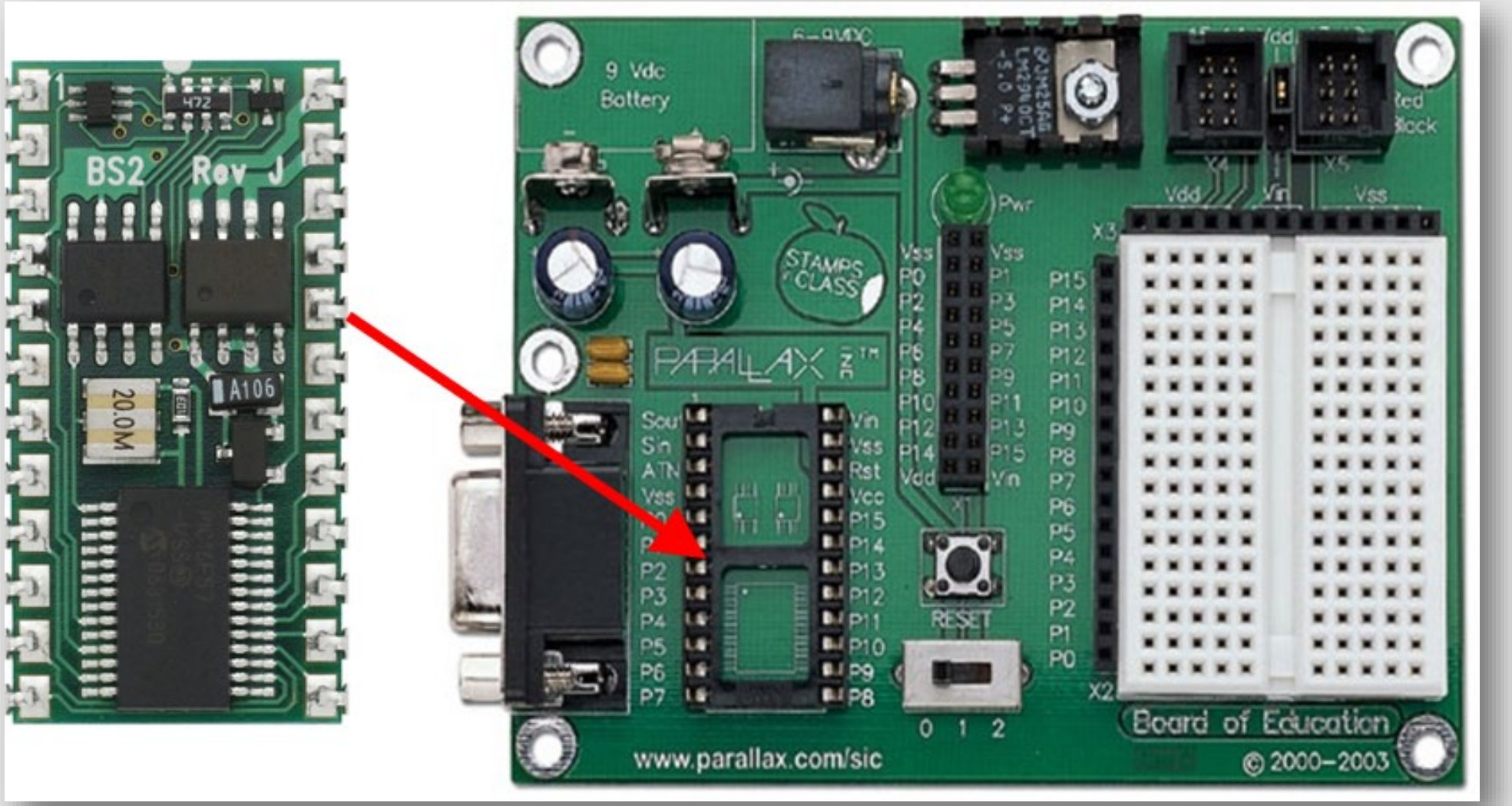
Mechatronics Lab
Understanding and Using Microcontrollers



The Circuit Board



Competition

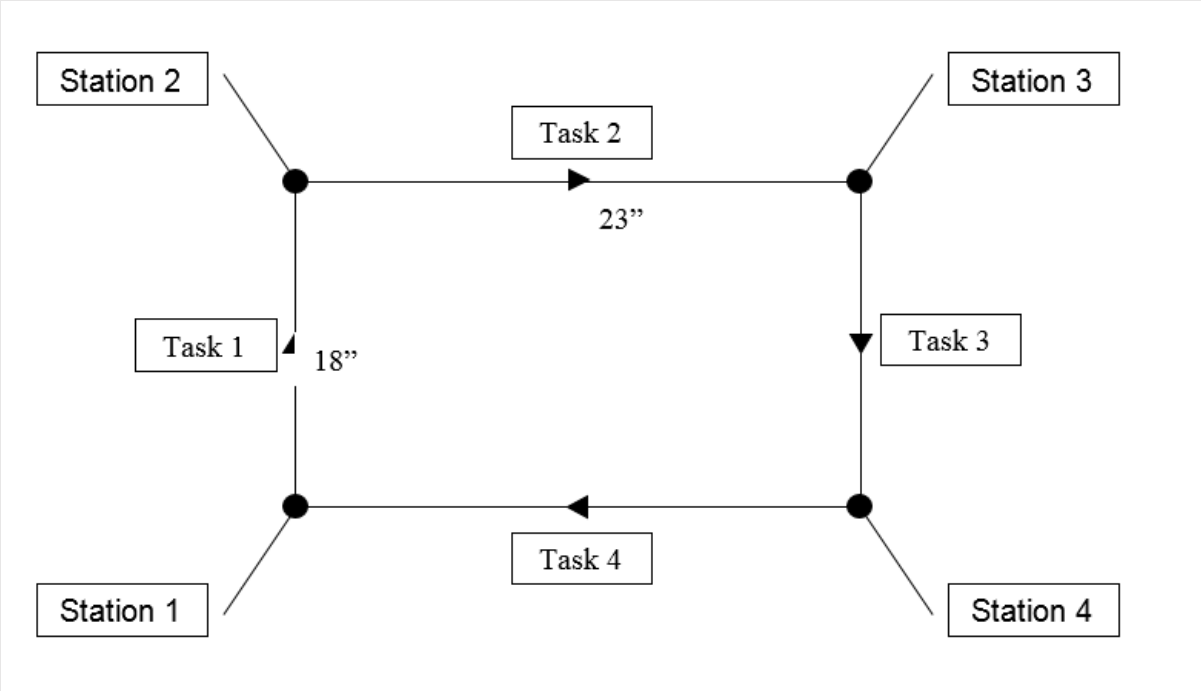
The goal of your final tasks are to make **Boe-Bot Robot** complete a basic track with various instructions and tasks. The following diagram shows the 18” x 23” rectangular track and the tasks required: This program will make Boe-Bot move in a rectangular path

Task 1: should start at Station 1 and move FORWARD to Station 2. After **Boe-Bot Robot** has arrived at Station 2, the beeper must sing a tune while the LED flashes in between each note.

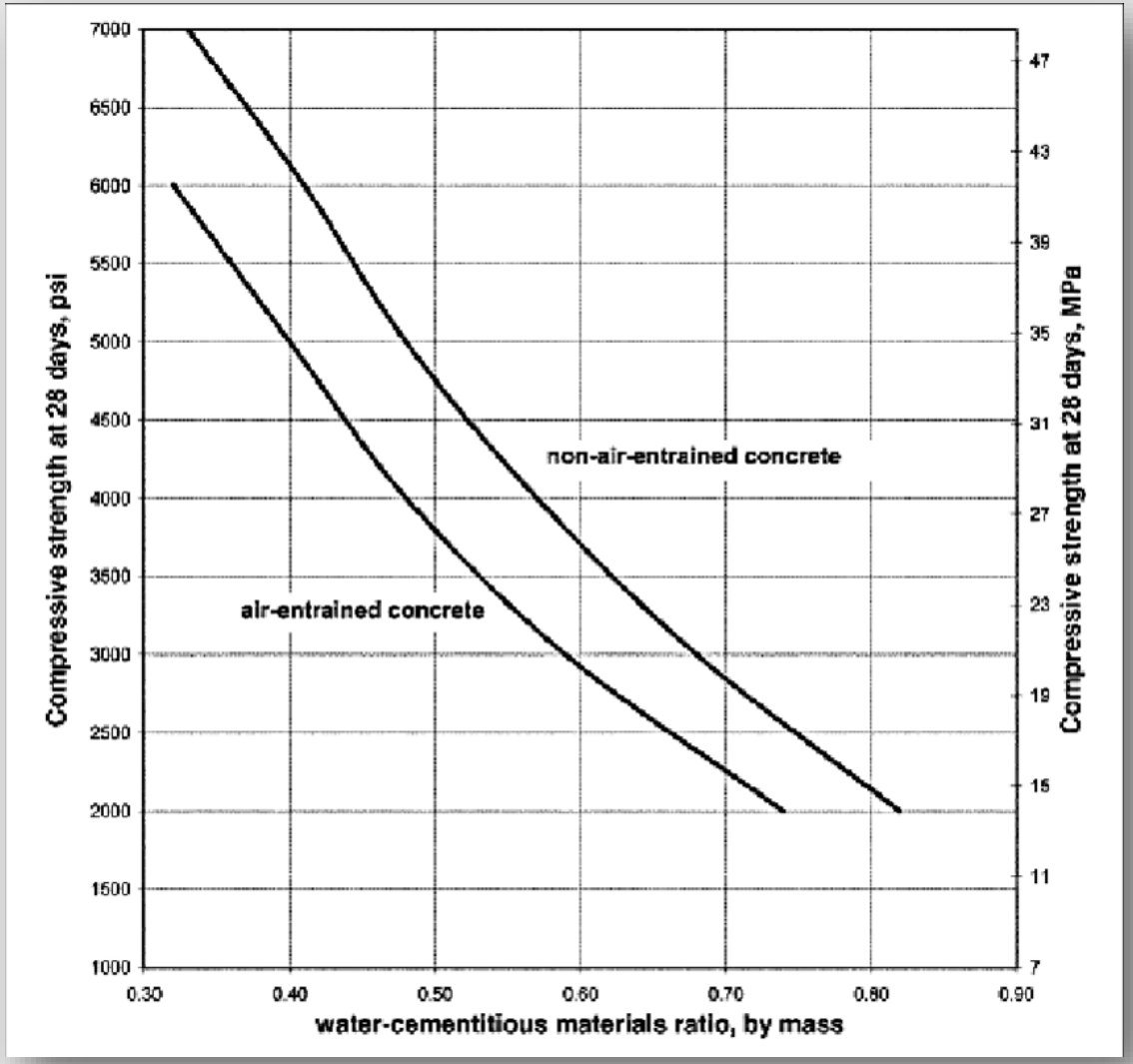
Task 2: should move FORWARD to Station 3.

Task 3: should move BACKWARDS to Station 4.

Task 4:should move FORWARD to Station 1 and stop in the same orientation which it started.



Optimum Concrete Design



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Anthropology

Lise Mifsud

Anthropology
Faculty Introduction

Lise Mifsud

- B.A. in Anthropology from U.C. Berkeley
- M.A. in Anthropology from University of Tennessee, Knoxville
- Forensic Osteology/Bioanthropology

Cuesta College Courses

- Physical Anthropology Lecture
- Physical Anthropology Lab
- Cultural Anthropology
- Native North Americans
- California Indians

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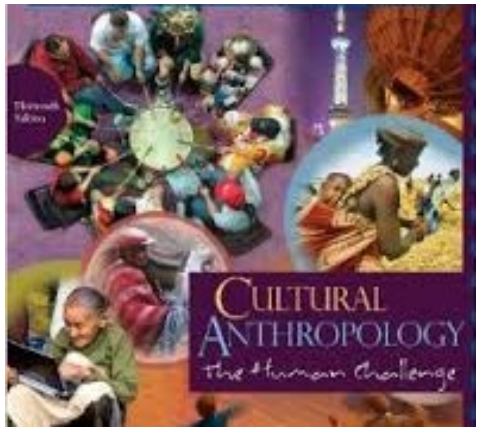

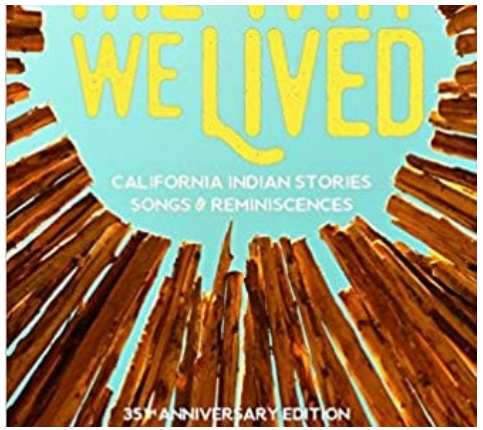

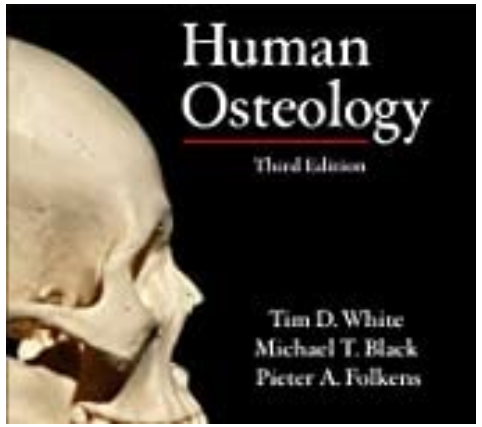

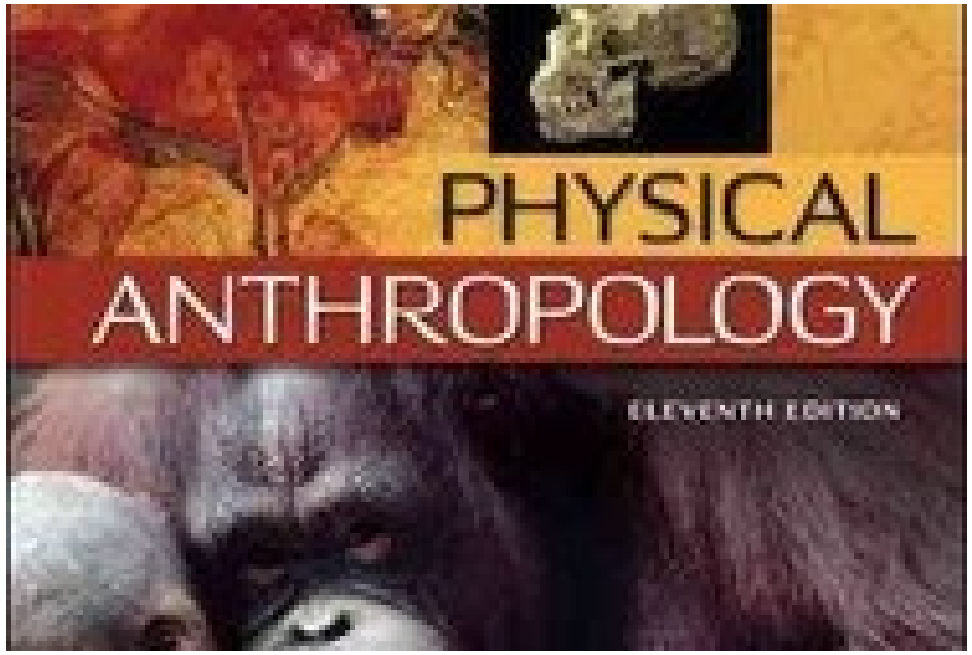

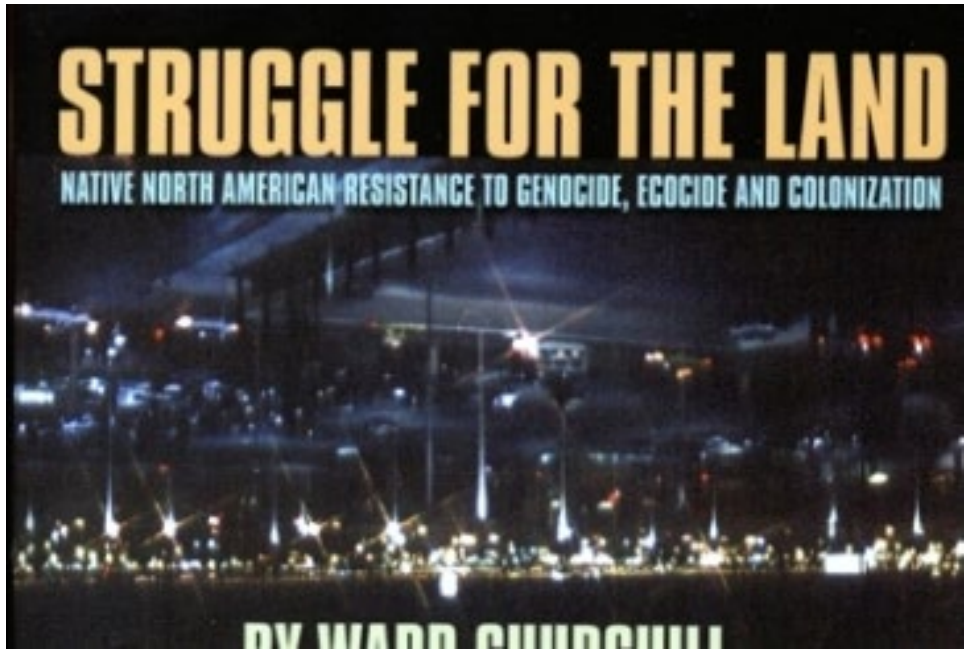

Research in Forensic Osteology/ Bioarchaeology

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Study of human bones in an archaeological context

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- Age

Analysis: The Big Four

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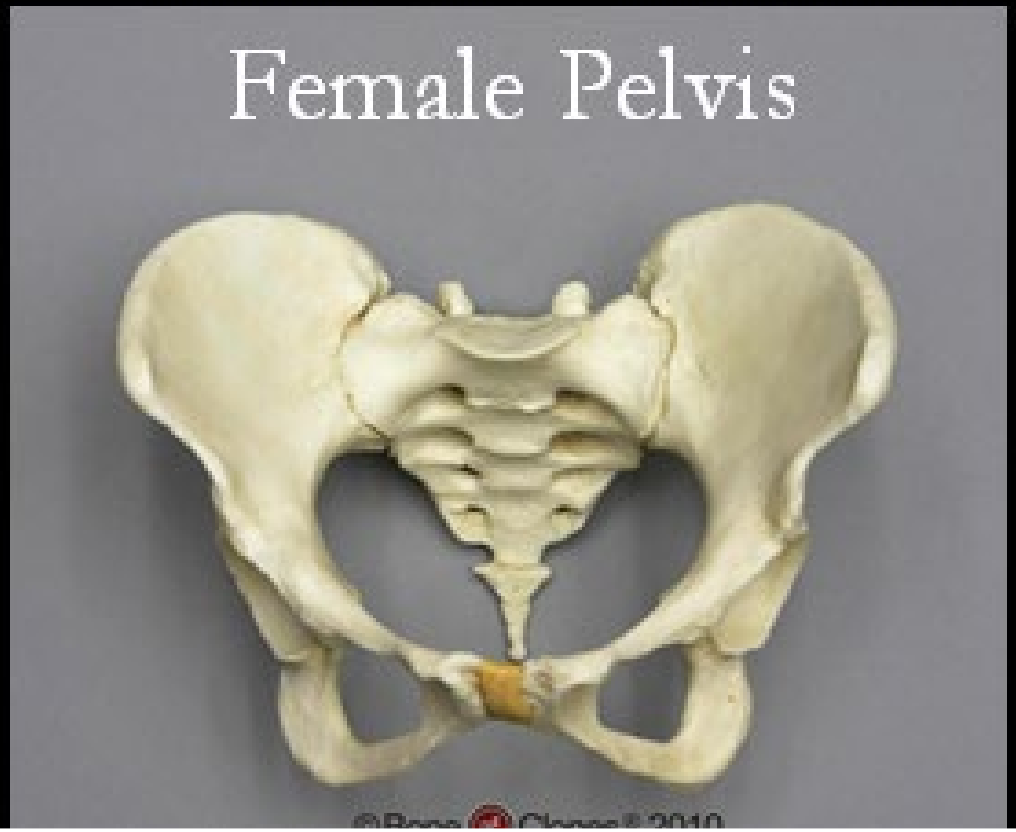
BIG FOUR

- Sex

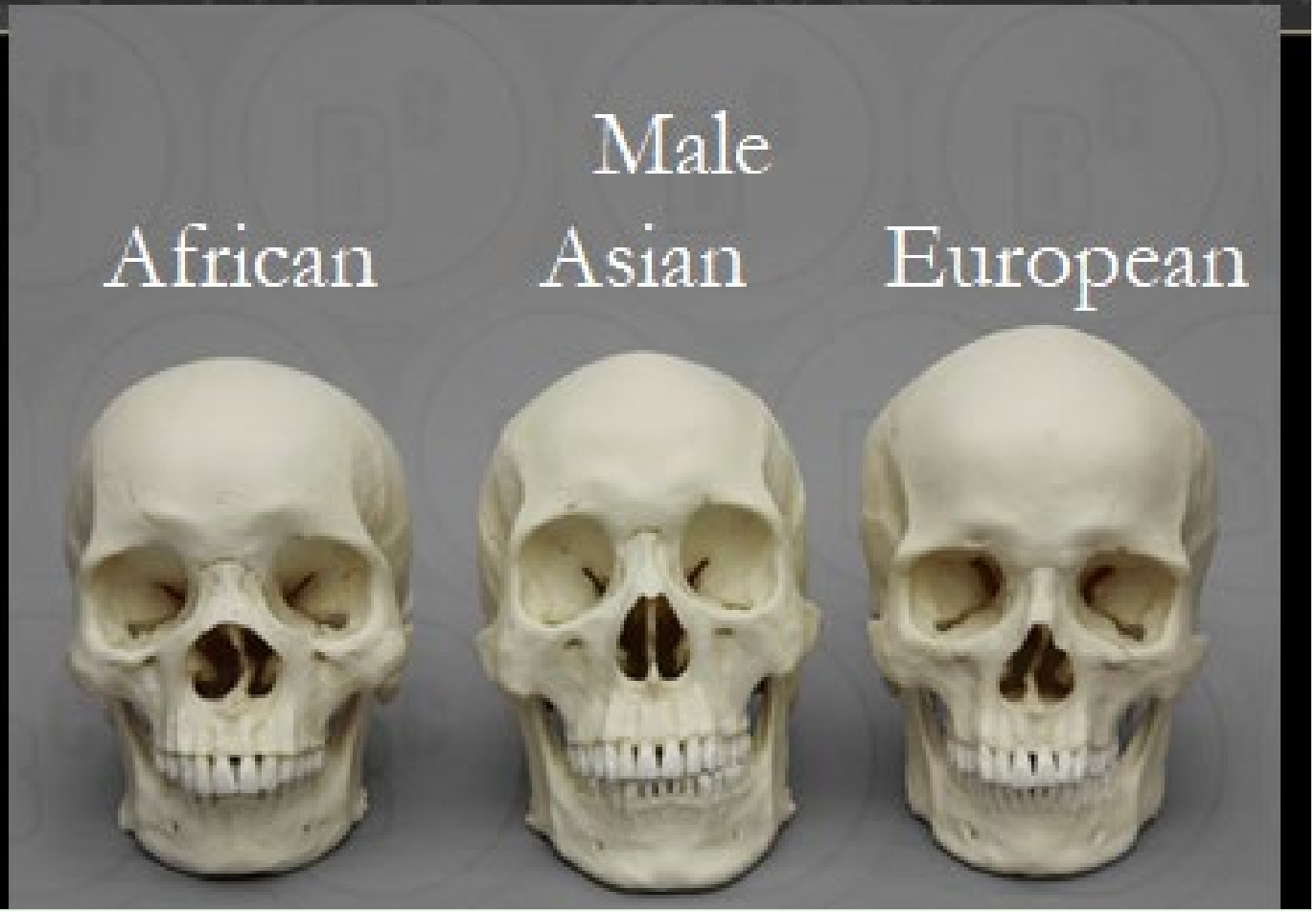


BIG FOUR

- Stature:
- Measure long bone(s)
- Plug value in to formula

BIG FOUR

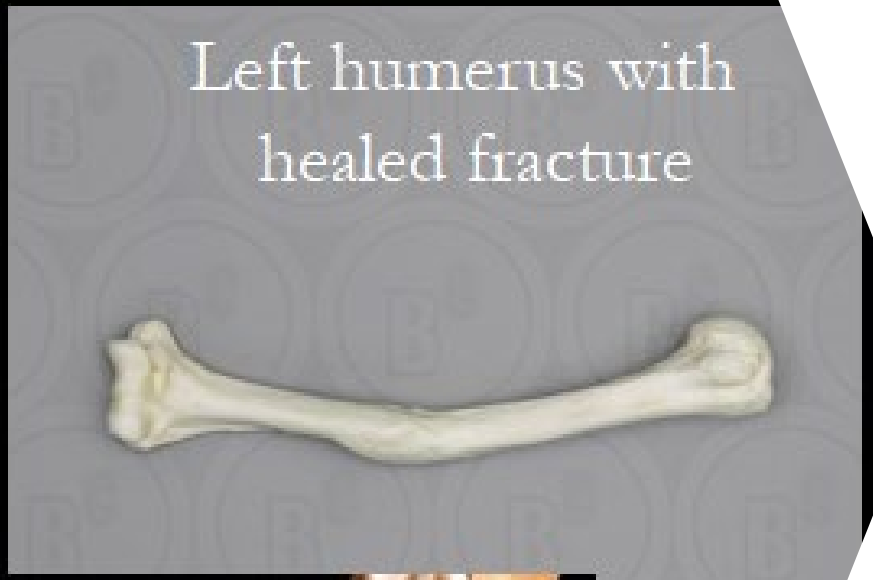
- Ancestry

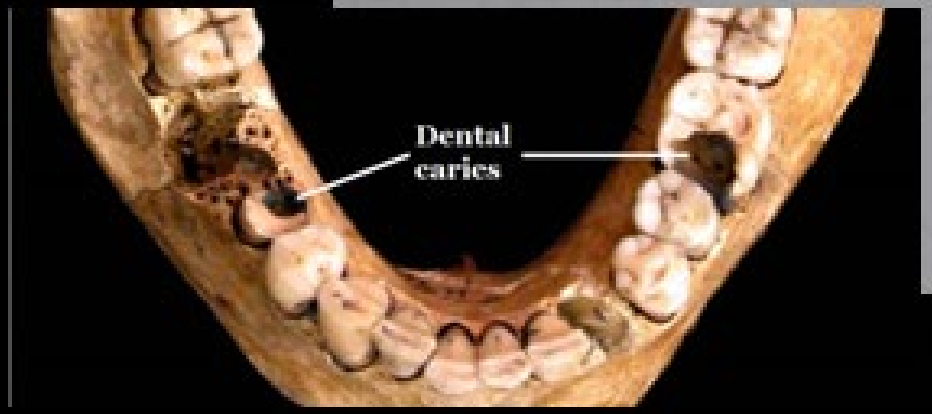


INDIVIDUATION

- Life-history recorded in bones and teeth.

Right patella with osteoarthritis





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Engaging Cuesta College Students in Anthropology Research

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Engaging Cuesta College Students in Anthropology Research

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Student Research in Anthropology:

- Analysis of skeletal remains.
- Evidence of butchering in Archaeological record.
- Effects of burning on bone.
- Neandertal language capabilities.
- Archaeology at Berkeley Shellmound.
- DNA, Autism and Evolution.
- Preparation for field schools:
  - In U.S., Italy, Greece, Poland and Ireland

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Q&A with Faculty Innovators

Thank you for participating!

To stay connected to Undergraduate Research at Cuesta College, please visit:

https://www.cuesta.edu/student/resources/careerconnections/undergraduate-research-opportunities/

We'd love to hear from you!

NSF IUSE Project Director and Biology Faculty:
Laurie_mcconnico@cuesta.edu

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