

Virtual

STEM EXPO

RRCC Student Research Symposium

Poster and Video presentations:

April 27 – 30, 2021

Please visit:

<https://www.rrcc.edu/hub/hub-expo>



HONORS PROGRAM
Red Rocks Community College



Spring 2021 Program

Thanks to all the students and faculty that participated in the STEM Expo this semester!

Faculty Advisors:

Johanna Debrecht, Math

Carlos Medina, Physics

Toni Nicholas, Honors and History

Barbra Sobhani, Honors and NASA Space Grant

STEM EXPO Organizers: Barbra Sobhani, Danae Fidler



Poster and Talk Presentations

Category: Honors

1. Cameron Burst

Environmental and Social Effects of Mao Zedong's Four Pests Campaign

In 1958, Mao Zedong launched the Great Leap Forward. This initiative aimed at industrializing China and surpassing Great Britain as the top steel producer. Among the many policies included in the Great Leap Forward, the Four Pests Campaign was one of the most consequential. This campaign called for the extermination of rats, mosquitos, flies, and sparrows as these "pests" were associated with the spread of disease and food shortages. The mass killing of sparrows directly led to a large increase in locust populations causing the largest famine in recorded history. 15 to 55 million died as a direct result of this famine. China's carbon dioxide emissions for the years of the famine were also noticeably effected when compared to the years proceeding and following.

HIS 247 Professor: Toni Nicholas

2. Karen Carrillo

Seveso Italy's Dioxin Cloud

Overall, this project was eye-opening and made me realize how one accident can lead to a completely different change of life. The dioxin cloud disaster in Seveso was an astonishing event that affected many people throughout generations. The Italian Seveso Dioxin cloud affected communities surrounding Seveso, Italy. The reaction with 2,3,7,8-tetrachlorodibenzo-p-dioxin and 2,4,5-trichlorophenol created a cloud that affected many of the communities close to the infected ICMESAS chemical plant. Although many people do not know about this disaster it's one of the most devastating chemical disasters known. Children and adults experienced this disaster's long-lasting effects. My project breaks down different effects that the community of Seveso experienced because of this horrible chemical disaster.

HIS 247 Professor: Toni Nicholas

3. Brad Davis

Amazon Rainforest: aka Oil Reserve

The Amazon Rainforest is a place of ecological mystery and unparalleled beauty. It has a history of resource exploitation the likes of which are unseen anywhere else on earth. Oil production here is a hot commodity. Countries worldwide share a stake in the profits. Examined here are the environmental, economical, and social effects proliferated in Ecuador's Andean foothill region. History of the area, as well as current issues and trends in oil extraction are detailed. Noting serious political undercurrents, and recent acute suffering due the COVID-19 pandemic; Ecuador seems to be a nation in desperate need of assistance.

HIS 247 Professor: Toni Nicholas

4. Sydney Gallagher

The Seveso Dioxin Cloud

In this presentation, I will explore the causes and effects of the Dioxin cloud which was released in a chemical explosion and impacted the town of Seveso Italy. I will look at the environmental harm and the impact of the Seveso population as well as the response and legacy of the disaster.

HIS 247 Professor: Toni Nicholas

5. Preston Guest

Nuclear v.s Fossil Fuel

Nuclear energy has been controversial since its dawn on humanity. There are various environmental and societal concerns regarding nuclear energy, but how does it stand up to the sustainability of fossil fuels?

HIS 247 Professor: Toni Nicholas

6. Mark Irby-Gill

The Panguna Mine, Papua New Guinea 1972-1989

In 1972, various subsidiaries of Rio Tinto Zinc (RTZ), an Australian mining company, opened the Panguna mine on Bougainville Island. Bougainville Island was located within Papua New Guinea (PNG), an Australian territory at the time. The indigenous population on Bougainville Island was not involved in the development of the Panguna mine. They operated on a kinship form of production that was based around “balanced reciprocity.” The mine impacted the lives of these *osikaiang* – original inhabitants- starting with the discovery of mineralization on the island in 1961. Families were displaced from their ancestral land. The food, water, and building sources they used for many generations were polluted or destroyed when construction started. After 16 years of continuous mining, the residents and landowners grew angry with the mining companies. A group of landowners organized and succeeded in disrupting the mines operations in 1988. However, the PNG government, with support from Australia, sent troops to re-open the mine. Australia eventually set up a naval blockade that cut the island off from supplies, causing the death of over 15000 people. This conflict, that grew into a civil war, caused Bougainville Copper Limited (BCL), a subsidiary of RTZ, to close Panguna Mine. Even though the mine has been closed since 1989, the environmental and social impacts of the mine continue to burgeon. In 2016, RTZ divested its majority stake in BCL, allowing the Autonomous Bougainville Government and the PNG Government to assume control of the company. RTZ also managed to escape any obligation to assist in any efforts to re-open the mine or address the cleanup. As a nation that has depended on foreign investment to develop a capitalist economy, the Island will not be able to recover unless it gets help from sources outside of the Island and PNG.

HIS 247 Professor: Toni Nicholas

7. Andrew Linz

The Andreev Bay Nuclear Incident

The spill of highly radiated water at the Andreev Bay nuclear storage facility in 1982 during Soviet era Russia is an interesting incident that still has cleanup efforts in progress to this day. To explore this incident further, information from primary and secondary sources has been summarized and presented in video format to bring attention to this lesser known nuclear spill. Additionally, data has been summarized from various ecological surveys looking to determine the effects of the radiation on the surrounding ecosystems of the Barents Sea to provide an insight into the modern day implications of this accident. Those studies found that although the ground and seawater were highly contaminated, the harmful effects of the contamination were minimal on major Barents Sea creatures like algae and molluscs. Going forward, plans to fully disassemble the nuclear storage facility and transport spent nuclear fuel cells that were never removed from the original cleanup in 1982 have been discussed.

HIS 247 Professor: Toni Nicholas

8. Ben McDill

Nuclear Testing at Bikini Atoll

Between 1945-58, Bikini Atoll was used as a nuclear testing site by the United States. During this period, 23 nuclear detonations occurred above and below the surface of the ocean at Bikini Atoll and within its lagoon, totaling 76.3 megatons of TNT explosive power, and devastating the local ocean ecosystem. Many of these detonations obliterated coral reefs and displaced massive amounts of reef and sediment. This presentation documents the events at Bikini Atoll and investigates the environmental impact that they caused. While nearby local island populations continue to be affected by the decade of nuclear testing, marine life at Bikini Atoll appears to be thriving.

HIS 247 Professor: Toni Nicholas

9. Nikole Rolston

Ecocide in Vietnam

This project explores the environmental affects that the Ecocide in Vietnam had on the trails, people and farm. When creating this project, it was easy to find four reliable sources of the horrific happenings that came about from the Ecocide in Vietnam. In 1961, this terrible event happened throughout Vietnam and Laos. During the Vietnam War the United States Military forces used a deadly toxin called The Agent orange to spray all forests and land for a couple of reasons. At this time, they used this spray to take down the tree so there were fewer hiding places, as well as strip all the crop so they had no food. The United States Military made a huge impact on Vietnam that destroyed their environment and their people. The project covers the background on how this happened, the terrible health effects and deforestation this caused. As well as, specific sections on the effects it has on certain places in Vietnam and the specific environmental impacts the Dioxin had on Vietnam. For the most part the Ecocide that occurred in Vietnam was extremely damaging to their environment that it left them confused and lost for help. The project contains many facts from reliable resources that help explain the environmental factors the Ecocide has on Vietnam.

HIS 247 Professor: Toni Nicholas

10. Kyle Seals

The Great Pacific Garbage Patch

The Great Pacific Garbage Patch is a huge formation of trash in the central North Pacific Ocean that is composed of micro plastics and other waste. It negatively impacts the marine environment and wildlife, and grows each year with increased global plastic waste. Plastic waste in the ocean is a major environmental issue that affects not only the sea life, but humans, who rely on healthy oceans. As the Great Pacific Garbage Patch grows, so does the need for change.

HIS 247 Professor: Toni Nicholas

11. Connor Stratford

The Great London Smog

I will discuss the great London smog

HIS 247 Professor: Toni Nicholas

12. Aidan Sullivan

Impacts of 1978 Amoco Cadiz Oil Spill

On the 16th of March 1978, the Amoco Cadiz oil tanker hit rocks approximately 2km off the coast of France. The tanker split into three separate pieces, spilling over 219 thousand tons of crude oil into the surrounding waters. The event reportedly caused upwards of 250 million dollars in damage to sea life and the surrounding environment. Erosion of beaches and diseased marine life were the main problems caused by the event. It took a group of up to 10,000 people to clean up the spill, but erosion as a result of the spill can still be seen today.

HIS 247 Professor: Toni Nicholas

13. Rick Venditti

Nuclear Testing

In this presentation, I go over the history of the testing of nuclear weapons by the U.S., Soviet Union, and other nuclear powers. I also talk about the effects that these tests had on the local environments, people, and the entire Earth as well.

HIS 247 Professor: Toni Nicholas

14. Caleb Christenson

Colorado River: The lifeline of the U.S.

The overuse of the Colorado river has caused more drastic droughts in the Colorado river basin region. I have investigated how this will have a greater effect on our everyday lives as well as methods to predict further drought so we can be prepared in the future. To further educate myself on these issues I utilized scientific journals, government environment websites, and scientific magazines. To verify the claims of these sources I cross referenced them to see if they agreed, if they are reliable sources, and if their sources were legitimate. I found that the Colorado river has a very large impact on our everyday lives. One in 10 people in the United States rely on the river as a primary source of water. Additionally, the river also provides power with 15 dams along the river. There are also several methods that are being developed to allow further drought prediction than is possible today. One such method uses oceanic data to predict the droughts of the river up to two years out, current methods are only reliable up to 6 months out. One of our most important rivers is in danger of drying up from overuse for economic and agricultural gain, we need to conserve our water if we do not want to continue to enjoy the Colorado river in the future. Further research into this topic, more public awareness, and other methods to predict drought are essential to keeping this river alive.

HNR 102 Professor: Barbra Sobhani

15. Sebastian Church

Adoption of Soil Health Management Practices and Farmer Variables

Understanding the factors that impact farmer behaviors is essential for planning programming focused on the adoption of soil health management practices. A meta-analysis (Baumgart-Getz, Prokopy and Floress, 2012) and several resources from the Natural Resource Conservation Service (NRCS) were reviewed to draw factors and conclusions about the effects of over 15 different factors. In order to communicate the findings of the meta-analysis, an infographic was designed containing the factors affection farmer decision-making, as well as different soil health management practices that farmers were deciding whether to adopt or not. The study by Prokopy et al. determined that further research is necessary to understand how these social factors and constructs interact to have significant impact on farmer decision-making. The meta-analysis also suggests that questions should target behavior-specific attitudes rather than general economic or environmental attitudes. By developing a more elaborate understanding of the factors that influence farmer decision-making, policies and programs for soil health management practices can then be designed with a focus on: 1) implementation and 2) individual farmer capacity and awareness.

HNR 102 Professor: Barbra Sobhani

16. Brad Davis

Our Mountains Are Water Towers

Colorado's alpine areas are unique in that they are adjacent to both urban and agricultural areas. This makes them some of the world's first indicators of climate change. Pollution and warming from automotive and factory emissions, and farming effect these sensitive climes; and can alert scientists to larger trends. Studying water catchment zones here in the front range, scientists from CU Boulder monitored water and pollutant levels as well as temperatures. They noted changes in composition and quality of water released in ionic pulses from stored groundwater. Subsequent degradation in compounds harms receiving flora, and fauna such as bighorn sheep. Not only do plants and animals receive less crucial nutrients, there is less water being released altogether. This is a problem for the area's inhabitants, as well as for humans who are affecting it.

HNR 102 Professor: Barbra Sobhani

17. Lexi Gimadeyevea

Our Changing Park: Climate Change in Rocky Mountain National Park

The climate change crisis is an international issue with close to home consequences. I will be discussing the way that climate change has and continues to effect Rocky Mountain National Park here in Colorado. Based on a

research study done by The Rocky Mountain Research Station that looks at the consequences of climate change on the six unique ecosystems found in the park, I will be presenting that information in the form of an infographic.

HNR 102 Professor: Barbra Sobhani

18. Grant Gonzalez

Teaching Climate Change -- An Objective With Complexities

This project began while I was researching different local issues regarding Coloradans' perceptions of climate change where I happened to stumble upon an article that exposed the lack of a solidified climate change curriculum within the Colorado school systems. I had always been interested in climate change as a younger student, but found that the Colorado schools that I went through hardly provided me (and my peers) with any information about the topic. After I had chosen my topic, I decided to focus my research on three different questions that examined various complexities regarding the issue of teaching climate change in schools. These three questions provided me with an excellent roadmap to follow when completing my research.

My research was composed of information from national news services, articles written by local Colorado journalists, and research studies that focused on tackling the challenge of teaching about climate change. While I was expecting climate change education to be fairly underdeveloped, I was surprised to see that it was much worse than I had originally predicted. In polls conducted by National Public Radio, I found that while most of the general public agrees that climate change should be taught in schools, less than half of all teachers (42%) regularly teach about climate change within their classrooms. While this information is only scratching the surface of all that I found, my research also led me to discover stories of the ways in which teachers in Colorado, New York, and North Carolina have worked around the lack of climate change curriculum in order to ensure that their students are thoroughly educated on the topic. In the end, I created an infographic to compile my information, which prevents my findings problem-first and solution-second.

HNR 102 Professor: Barbra Sobhani

19. Kelvin Hoang

Secondary Research on Liquid Crystal Elastomers (LCEs)

Liquid crystal elastomers (LCEs) are soft and multifunctional materials that combine the anisotropic molecular order of liquid crystals with the entropic elasticity of covalent bonded polymer chain backbone. This allows LCEs to have the incredible ability to absorb high amounts of strain energy. This gives light to how LCEs can be used in many different energy dissipative structures such as sports and personal protective equipment.

HNR 289 Professor: Barbra Sobhani

20. Andrew Linz

How do we Determine Air Quality?

Air quality has been shown to have a profound impact on human health, especially in highly populated urban areas. As such, understanding what goes into determining air quality, the impacts it can have on a person's health, and what some common sources of air pollution are is important at a societal level. In order to find a way to quickly and easily teach people about air quality, an infographic was produced with the goal of communicating all the necessary information about air quality and the air quality index in a format that is easy to access and understand. The infographic includes information on how to read the air quality index and common factors that contribute to air quality such as volatile organic compounds (VOCs), particulate matter concentrations, ground level ozone, and noxious gases. Additionally, the effects that each of these factors have on a person's health are summarized from multiple other studies.

HNR 102 Professor: Barbra Sobhani

21. Ben McDill

Increasing Wildfires in Colorado

Wildfires in the Western US cause immense ecological and economical damage every year, and as the severity of wildfires increases each year, understanding the causes becomes an urgent matter. As more studies are conducted a correlation has been found between increases in average global temperatures caused by anthropogenic climate change and increased wildfire severity. This correlation has been the focus of research to better understand why climate change would impact wildfires. A study that analyzes the relationship between fuel aridity (how dry biomass in forests becomes) and acreage burned was the primary data used for creating this infographic. This study used several metrics for fuel aridity and found that as fuel aridity increases, the amount of acreage burned annually has increased. The outlook suggests this trend will continue and combating climate change is an essential task to address increasing wildfires. Recommendations for further research include studying how current forest management strategies impact wildfires, and how to modify forest management strategies to decrease annual acreage burned.

HNR 102 Professor: Barbra Sobhani

22. Rachel Okrey

Why The Colorado River is Drying Up

Introduction: The Colorado river is used by millions of people in the midwest for many purposes. This includes trillions of dollars of economic uses. In recent years, due to climate change, less snowfall has led to less reflection of sunlight; also known as albedo. Ultimately, this is leading to higher rates of evaporation and loss of water volume in the Colorado river.

Methods: Multiple peer-reviewed journals that discuss this topic of concern were analyzed and data was compiled to reference in the final infographic.

Results: It is clear that the Colorado river is losing water at a rate that is correlated with an increase in global temperatures. It was found that the annual-mean discharge of the Colorado River is decreasing by 9.3% per °C of warming. The Colorado river that used to run into the Pacific Ocean, hasn't reached it since 2014 due to being overdrawn on.

Conclusion: Actions must be taken to prevent economic and environmental collapse. Voting for legislation that protects our natural resources and getting involved with organizations that focus on protecting the Colorado river can be very helpful in this matter.

HNR 102 Professor: Barbra Sobhani

23. Sean O'Neil

Power System Quick Start Guide

Easy to read technical documentation to help cybersecurity faculty work with an off-grid power system composed of smart devices used as targets for cybersecurity education.

HNR 289 Professor: Barbra Sobhani

24. Charles Pool

Sudden Aspen Decline

HNR 102 Professor: Barbra Sobhani

25. Cid Quezada

eBoard

Making an electric seemed not only very fun but also very convenient for school as getting around can be a pain and lets be honest no college student like walking up hills to get to class. Another thing is that collage students also tend to not have a lot of funding for transportation like a full on electric skateboard and this is why I decided to build my own. I used cheaper controller and parts the run at about the same specs but also took some shortcuts for example designing a casing for the components. Also just building it yourself cuts a lot of middle men that increase the value of a product.

HNR 289 Professor: Barbra Sobhani

26. Michael Rowcotsky

Economic Impacts of Climate Change in Colorado

HNR 102 Professor: Barbra Sobhani

27. Ruby Schumacher

Desertification on the Colorado Plateau

Desertification is the turning of fertile land into desert; land full of life and activity becoming uninhabitable for all species. This is an issue that is occurring globally. A specific example of this phenomenon is located on the Colorado Plateau due to droughts, plant competition, and unsustainable agriculture methods. It has caused cracked and eroded soil, resource shortages for plants and animals alike, and has hurt the farming industry with less grazing areas for cattle. To combat this, studies have mapped locations based on the most prominent issue and work to proactively change it. This includes mechanical fires for invasive plants, replanting of native brush and shrub, and relocating wildlife like mule deer and elk. This has found a 15% increase in native grass, a 2% increase in native forb, and a 5% total decrease in bare ground that leads to cracked and eroded soil. Mechanical fires have also improved the protective layering of soil in 25% of the fires used. While this is a continuing process and only features one area of the word, further efforts need to be made to slow and prevent desertification. Mapping out these areas in need and working to fight the problem from its root, as well as reeducation of farmers and innovation for sustainable livestock raising is crucial to a healthier Earth.

HNR 102 Professor: Barbra Sobhani

Category: Math, Engineering & Physics

1. Antoan Andreev

Toroflux

The topic of my project is Toroflux. A toroflux is a toy, which became popular in the 90s. It resembles a slinky with the only difference being that toroflux extends itself in three dimensions. Toroflux has the shape of a torus. A torus is a surface of revolution created by revolving a circle in three dimensional space. For my project, I am going to create my own toroflux, utilizing a 27-foot steel wire. In addition, I'm going to relate a few mathematical/physics equations that are relevant to its shape and motion. Also, I will demonstrate several of its mechanical properties such as centrifugal force and the "rolling down" effect.

PHY 212 Professor: Carlos Medina

2. Grant Barbone

Virtual simulation of Electric fields

The experiment is to create a simulation of multiple electrical forces within a 3d plot and then use machine learning to identify where an extra electric charge needs to be to balance out the electrical field. This experiment is used to identify whether machine learning as a viable option to study how electrical fields work and to identify where an electric charge should be located in various scenarios dependent on the amount of charges within the entire electric field.

PHY 212 Professor: Carlos Medina

3. Jose Barrientos

Nature Journaling with ELK

I am proposing to partner with a local Environmental Education Organization that cater to urban/diverse group of student and present a program or various programs throughout the year to demonstrate Nature Journaling and to promote observation, creativity, and passion to interact with the outdoor at various level. This organization already promotes outdoor recreation and afterschool classes, my plan is to create a pathway from art classes in a classroom to creativity in the outdoors. By partnering with this organization I will also promote representation of diversity in the outdoor and try to answer any questions/promote employment/careers in the outdoor industry.

OUT 175 Professor: Barbra Sobhani, Kate Hogan, Deb Kulcsar

4. Autumn Bauman

Coulomb's Spheres

Measuring the static charge stored on objects using Culomb's law and gravitational force. In the experiment I charge two spheres which are suspended from a low mass string, then release them. Based on the horizontal displacement between the two, the charges can be found by Culomb's law.

PHY 212 Professor: Carlos Medina

5. Lara Bezerra

Koch's Snowflake

Poster about Koch's snowflake and a bit about fractals in general. Mathematical proof of its area and perimeter presented.

MAT 202 Professor: Johanna Debrecht

6. Jacob Carman

Homemade Telegraph

I will be building and then studying a Homemade Telegraph. I will primarily be studying the relationship of the strength of the battery to the length of the wire. I will also be looking for possible ways to improve upon my design (if I have time) and will make changes to improve it as well as redo the study.

PHY 212 Professor: Dr. Carlos Medina

7. Colin Chader

Homemade Telegraph- Do You Read Me?

Telegraphs work by completing a circuit, so by building a telegraph one could could prove how circuits and electromagnets work especially once completed and how one of the most simple yet effective communication methods was developed. Did you receive my message? Prove and demonstrate how simple circuits works and by extension, electromagnetism.

PHY 212 Professor: Dr. Carlos Medina

8. Thomas Coates

Calculus 2 (Evaluating limits)

Ill be working 1-2 Calculus 2 problems.

$$\int (\sin(x))^2 (\cos(x))^2 dx$$

$$\lim_{x \rightarrow \infty} \left(\frac{20x}{20x+3} \right)^{7x}$$

MAT 202 Professor: Johanna Debrecht

9. Dawn Florance

Cosmic Ray Detector

Around all humans and every other surface on earth, there is radiation colliding with the atoms that make up all matter. This natural radiation is made up of cosmic rays. Cosmic rays are high-energy subatomic particles that constantly bombard the Earth from outer space. These rays travel through space at a speed approaching that of light. This radiation is harmless and invisible. However, we are able to see the tracks that these particles leave behind using a cloud chamber.

A cloud chamber is a device used to detect ionizing particles and determine their trajectories. It does not show the invisible particles themselves, but where they have been. This chamber consists of a sealed environment which includes a warm top plate and a cold bottom plate. Isopropyl alcohol is a required source on the warm side and is where the liquid evaporates. This evaporation creates a vapor that cools as it falls through the gas and condenses on the cold bottom plate. The alcohol saturates the chamber and provides a steep temperature gradient. The result is a supersaturated environment. As energetic charged particles pass through the gas they leave ionization trails which we can see with the naked eye.

PHY 212 Professor: Dr. Carlos Medina

10. Lexi Gimadeyeva

Battery Drag Race: The Effect of Current on the Velocity of a Simple Electromagnetic Train

A simple electromagnetic train composed of a battery and two magnets inside a copper wire solenoid creates a circuit with a current. That current is dependent on the Amps per hour that each battery is capable of producing. This experiment is a drag race between an AA, AAA, and C battery, each with constant voltage, number of turns in the solenoid, and length of the solenoid, but with varying current capacity of the batteries. Based on the current of each circuit, the electromagnetic field around that circuit will be determined theoretically. The theoretical magnetic field will then be compared to the experimentally established velocities of each train to establish how current inside a circuit effects the speed of the train.

PHY 212 Professor: Dr. Carlos Medina

11. Christina Gloor

The Mathematics of Herd Immunity

Infectious diseases have been a concern for all life on Earth since the beginning of time—microorganisms invisible to the eye have the power to wipe out entire communities. The field of epidemiology studies how infectious diseases move through a population and can give community leaders the tools to make data-driven decisions on how best to protect the quality and longevity of lives of their citizens.

Advancements in the application of mathematics to epidemiology have contributed widely to the ability of scientists to model the course of an outbreak or disease, providing critical information on what actions can be taken to reduce its severity. The purpose of this poster is to highlight the basic mathematical principles used in the field of epidemiology to determine the herd immunity threshold, model the dynamics of an outbreak, and the application of these concepts to the COVID-19 pandemic.

MAT 204 Professor: Johanna Debrecht

12. Stephanie Howell

Wimshurst Machine and the Power of Flight

Through the construction and development of a Wimshurst machine (an electrostatic generator), experiments will be conducted to determine the precise setup for producing ionic wind to achieve optimal flight of an object.

PHY 212 Professor: Dr. Carlos Medina

13. Mackenzie Malkowski

Homemade Seismographer

Observing and investigating homemade seismographer

PHY 211 Professor: Dr. Carlos Medina

14. Ben McDill

Calculating Work and Experimenting with a Water Pump

In this video I explain how to calculate the work required to pump water out of a reservoir. I also perform a small experiment with a submersible water pump in an attempt to find a relationship between the work required to vacate the reservoir and the energy consumed by the 4W pump. While some interesting data is collected, there remain questions to be answered. My conclusion suggests that the average submersible pump is extremely inefficient in transforming energy... or I've made significant mistakes.

MAT 204 Professor: Johanna Debrecht

15. Greg Ruterbories

Educational Native Pollinator Garden K-8

Presenting method/ plan to develop and implement a pollinator garden in a community garden application. The proposed example garden is located at a K-8 school and is volunteer run by parents, students and teachers for educational purposes. The garden is cared for in the summer by volunteers with the harvest in the fall when classes return. The garden is currently grown arranged by color and for growing edible produce. The addition of a native pollinator garden will provide many opportunities for students to explore natural processes on school grounds. In conjunction with the development of the garden several enrichments to current STEM curriculum could be added. Foremost, lessons in the value of pollinators in the ecosystem, including their role in agriculture and the environment at large. Further development could be ethical bird feeders, birdhouses and bat boxes with activities for 5th to 8th grade students such as monitoring the garden or creating data sets on results of pollinators found in at different times.

OUT 175 Professor: Barbra Sobhani

16. Nate Saldana

Homemade Wimshurst Machine

I am creating a replica of the last great electrostatic machine, the Wimshurst Machine. The Wimshurst Machine is an electrostatic generator that works through induction to generate high voltage differences and sparks between two electrodes. I will be using simple items around the house, such as CD's, cardboard, shoe string, etc., to create my Wimshurst Machine. Done correctly, my Wimshurst machine will transform mechanical energy to electrostatic energy by moving, collecting, and discharging positive and negative charges.

PHY 212 Professor: Dr. Carlos Medina

17. Avery Thigpen

Wave Machine

A wave machine will be built to illustrate energy passing through a transverse wave. The objective is to vary the velocities, and mathematically solve and compare how velocity affects the frequency and wavelength. The fundamental equations for waves on a string will be used to solve for the wavelength and frequency. The distance and the tension of the wave machine will remain constant. Changing the mass of the machine will affect the velocity, and in turn, affect the frequency and wavelength; therefore, how mass affects these values will be tested as well. Using common supplies, the wave machine will consist of duct tape, wooden skewers,

and jelly candy. The amplitude will be altered; however, it should not affect the velocity. This will also be tested. Finally, the theoretical and measured values for velocity will be compared and contrasted.

PHY 212 Professor: Dr. Carlos Medina

18. Ikem Uge

Rail Gun

PHY 211 Professor: Dr. Carlos Medina