

# Senior Projects

2023–2024



**BASIS GOODYEAR**

At this point in their senior year, BASIS Charter School students have completed a set of four BASIS Capstone classes to earn their BASIS Honors Diploma. In addition, many students are in the process of completing the College Board's AP Capstone Diploma™, a challenging, two-year sequence of AP Seminar™ and AP Research™, plus four other AP® Exams—all of which require extensive research, writing, and oral defense. The BASIS Diploma Senior Project marks the culmination of this hard work and perseverance.

Completed in the third trimester of a student's senior year, the Senior Project is unique, self-designed, and reflective of each student's varied academic interests and passions. Regardless of the discipline—business, art, humanities, science, engineering, social work, medicine, or law—each senior must develop and explore a research question. Creating an abstract that sets the tone of the research, participating seniors must submit a project proposal, and later, orally defend their methodologies.

Under the guidance of an external advisor who is a professional in their field, as well as a faculty advisor from their school, students dedicate 10–15 hours per week to the completion of their Senior Project. To document their journey, students post weekly blog entries about their experiences, successes, and challenges as they explore their guiding question. This journaling provides a unique viewpoint on the students' activities and adds a reflective layer to their research process.

Throughout the development of the Senior Project, BASIS Charter Schools support their seniors every step of the way. The project summaries in this publication clearly illustrate each senior's ability to apply the knowledge and intellectual curiosity they have acquired in the classroom to professional research methods. At the successful conclusion of this project, students are eligible for a BASIS Diploma with High Honors, the most distinguished accolade offered by BASIS Charter Schools.

Each member of the BASIS Charter Schools network commends our seniors for their dedication and motivation—not only for completing this Senior Project, but for their commitment to the BASIS Charter School Curriculum. Congratulations to them on this powerful achievement, and our best wishes as they move forward on their educational journey.



Carolyn McGarvey  
Chief Executive Officer  
BASIS Ed AZ, DC, LA



David Hubalik  
Chief Executive Officer  
BASIS Ed Texas

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## GRECIA A.



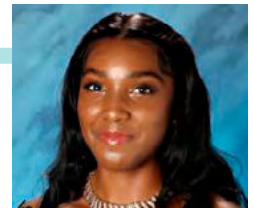
### WILL THE BIODIGESTER BE THE HERO FOR AREAS STRUGGLING WITH WASTE AND A LACK OF SEWAGE SYSTEM?

**SUMMARY:** An unbelievable number of areas around the world struggle to maintain their communities and water sources clean from human waste. Contamination from feces has led to parasites and diseases for those who live in these impoverished areas. Although most Americans take their sewage system for granted, most studies find that it is a luxury many people in developing countries live without. A solution to this is biodigesters, a system that biologically processes organic material into digestate and biogas. Despite this technology, the people in struggling areas remain uninformed on how to better their living conditions. I have educated myself through research on all related subjects such as anaerobic digestion, sewage maintenance, areas full of waste, and all the processes required. My research has included the latest studies, textbooks, and other countries' work with biodigesters. All the information needed to safely and efficiently build a biodigester is included in my concise pamphlet. In spreading my pamphlet, I am bringing awareness and offering a solution to those currently suffering. Additionally, I have completed a blueprint of a biodigester to visualize the final product. Through this information, I hope to inspire families to better their living conditions and bring benefits for their community to thrive.

• **BASIS ADVISOR:** Jershon Eagar • **ON-SITE MENTOR:** Pavan Puttamraju • **LOCATION:** Independent Research

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## JEMIMAH A.



### EXPLORING THE EFFECTIVENESS OF NON-PHARMACOLOGICAL CARE IN INFANTS WITH NEONATAL ABSTINENCE SYNDROME

**SUMMARY:** This research project examined the efficacy of non-pharmacological care for mothers and families with infants diagnosed with Neonatal Abstinence Syndrome (NAS), particularly those residing in low-income communities or with low socioeconomic circumstances. NAS occurs when infants, in the utero, are exposed to drugs, such as opioids. Once born, these infants are addicted to opioids. This research encompassed a comprehensive review of case studies, scholarly articles, and clinics implementing non-pharmacological care models. A specific focus was placed on evaluating the significance and importance of non-pharmacological care in infants affected by neonatal abstinence syndrome, as well as an exploration into the current treatment options for mothers and infants, available both before birth and after. An in-depth analysis of non-pharmacological care for Neonatal Abstinence Syndrome and its contributions to the recovery process was taken into account in order to fully understand the practical implementations. Interviews with healthcare professionals such as doctors and nurses were conducted to gain deeper insights, aiming to enrich the understanding of this crucial topic.

• **BASIS ADVISOR:** Madeline Nicholls • **ON-SITE MENTOR:** Terry Edington (Banner) and Rosalva Acevedo Garcia (Valleywise) • **LOCATION:** Banner Thunderbird Hospital and Valleywise Health Clinic

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## HANNAH B.



### **ANALYZING METHODS TO MITIGATE BOTH THE NEGATIVE MENTAL AND PHYSICAL EFFECTS CAUSED BY A MENSTRUAL CYCLE**

**SUMMARY:** Periods, an uncomfortable and taboo topic for many that is often overlooked but something that nearly every woman must experience. A woman's menstrual cycle can be painful for many women with numerous symptoms taking a toll not only on their physical health but also their mental health. In this project I did an inquiry on the various symptoms, both mental and physical, that young women between the ages of 18-25 experienced during their menstrual cycle along with the menstrual products and remedies they used to ease their symptoms. With that data acquired, I used the information from the survey along with case studies and other documents of research to analyze the complex and numerous biological processes and both the mental and physical impacts on a woman during her menstrual cycle. I also researched the most favorable and effective menstrual products and treatments used to address specific symptoms undergone during one's menstrual cycle. By analyzing these methods, I spread awareness for women with effective solutions that can be used to mitigate their symptoms caused by their menstrual cycle.

- **BASIS ADVISOR:** Jasmine Johnson • **ON-SITE MENTOR:** Bruce Ploeser, PA-C
- **LOCATION:** Healthy Life Family Medicine

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## MEGAN C.



### **FENTANYL OVERDOSES: HOW OVERPRESCRIPTION AND LACK OF INDIVIDUAL PURPOSE HAS LED TO AN INCREASE IN FENTANYL DEATHS**

**SUMMARY:** According to the CDC, overdose deaths from synthetic opioids increased by 55.6 percent from 2020 to 2021 and are the predominant cause of the rise in total drug overdose deaths. Fentanyl is currently the most dangerous synthetic opioid on the market because it is inexpensive to produce and can be lethal in small doses. On the surface, it may seem unclear why fentanyl gained popularity and why overdose cases are on the rise. By investigating this topic, I aimed to understand how the over-prescription and misbranding of opioids in the early 2000s led to the increased popularity of heroin as a street drug, and narcotics being laced with fentanyl today. I interned with the Way Out West Coalition, a group dedicated to substance prevention for youth in the West Valley. Through my external experience, I learned ways to help kids build resiliency skills such as problem solving, setting goals, and dealing with stress. By exploring this topic, I hoped to play a role in raising awareness among the public—specifically teenagers—on the dangers of drugs, the reasons teens may turn to drugs, and strategies to avoid substance abuse. I've learned that most adults that abuse substances started as a teenager, so it is important to talk with teens to prevent this behavior.

- **BASIS ADVISOR:** Bryan Baker • **ON-SITE MENTOR:** Joe Tracey • **LOCATION:** WOW Coalition

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## NATALIE F.



### MODERN-DAY DEBUTS: THE IMPACT OF SOCIAL MEDIA ON CULTURAL CELEBRATIONS

**SUMMARY:** Every culture has a different way of celebrating coming-of-age and adulthood. For young Filipina girls, they celebrate their 18th birthday with a party called a “debut”. To better understand where these traditions come from and why we celebrate debuts a certain way today, I have investigated the Filipino debut’s evolution. Using my findings, I analyzed what this important ritual looks like from planning to the day of the debut, considering external influences present in the modern day like social media. At The Confetti Studio, a wedding and curated event rental business in Phoenix, I worked with and observed professionals in the wedding industry to understand how events similar in scale and significance to debuts are planned with inspiration from social media and the reality of financial restraints. Through work done on social media promotions for the company, I have learned more about the effects of modern marketing techniques on these extravagant parties. My research aims to bring more awareness to the Filipino debut along with its significance to those who celebrate to understand the extensive money, privilege, and effort required to host one.

- **BASIS ADVISOR:** Drucila Gonzalez • **ON-SITE MENTOR:** Sharmaine Garcia and Tara Jensen
- **LOCATION:** Confetti Studio

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## DANA G.



### THE (HEART) BEAT GOES ON TO A DIFFERENT TUNE: THE HISTORY AND DEVELOPMENT OF PACEMAKER TECHNOLOGY

**SUMMARY:** This project highlighted the developments and evolution of pacemaker technology by sourcing both research and theoretical clinical trials out there, while also including interviews with cardiac patients. This was a great opportunity to spread awareness and information about pacemaker devices as well as evaluate their efficiency for patients with chronic heart conditions through research and patients' perspectives. This area of study is significant because comparing clinical trials and personal patient experiences provided my project with both quantitative and qualitative analysis to determine if certain pacemakers are more superior than others. My project research was through academic journals, published studies, medical database websites and peer-reviewed scientific articles. I ensured proper data collection, by working alongside a cardiac surgeon while interning at an Arizona Hospital. Ultimately, I chose this topic because cardiac health has become a prominent issue in America, with over a million people suffering chronic heart conditions including heart disease, with many individuals fighting for their lives everyday, but remaining alive because of pacemaker technology. Additional, accessible research and information should be made publicly available and translated into language that is easy to understand for the general population. Through this project I was able to shed light on the progression of pacemaker engineering and technological advances that have extended the livelihood and longevity for those with chronic heart conditions.

- **BASIS ADVISOR:** Christine Dell • **ON-SITE MENTOR:** Kai Sung, MD • **LOCATION:** Tri-City Cardiology

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## CARTER K.



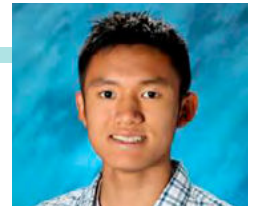
### EXPLORING SUSTAINABLE AND EFFECTIVE DESICCANT PACKET ALTERNATIVES TO PLASTICS

**SUMMARY:** My project attempts to address the packaging industries contribution to the mounting problem of plastic waste. More specifically, I have researched and tested alternative materials that can be used to replace polyethylene bagged desiccants found in most product packages to keep products dry, as a way to reduce plastic waste that commonly ends up in the landfill and the environment. This problem is significant because desiccants are found in almost every package but are commonly thrown away, where they end up in landfills, and are hard to recycle, despite commonly being bagged in polyethylene plastic sachets. I have been conducting research and testing at the Intel Corporation in the Transport Media and Materials Engineering Department alongside a Mechanical Test and Development Engineer. Although modeling and theory is important to tackling sustainability, physical testing is needed to support theory and provide results for finding the best options. Plastic is one of the cheapest options while sustainable alternatives are more expensive but the cost of sustainability may outweigh the cost of plastic to the environment.

• **BASIS ADVISOR:** Jershon Eagar • **ON-SITE MENTOR:** Joel Scofield • **LOCATION:** Intel Corporation

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## NOLAN L.



### THE NECESSITY OF GOOD SLEEP: HOW SLEEP AFFECTS OUR HEALTH AND WELL-BEING

**SUMMARY:** Everybody sleeps and everybody acknowledges that sleep is just a part of your daily life. Everybody understands this, but most people don't know how important or impactful sleep can be. People do not understand that a significant amount of their problems or inconveniences stem from the lack of sleep. Our youth make up many of these people. These problems include depression, fatigue, and chronic illness, all of which will affect your everyday life and ability to be productive, which causes people to sacrifice even more sleep to make up for the loss of productivity. It is a never-ending cycle that happens when people do not understand the importance and value of good sleep. This is why I researched and learned exactly how different qualities of sleep affects people in their mental and physical well-being. Sleep is already known to be an essential part of life, and through this research, I educated not only myself but my peers on its benefits so that we can keep healthy habits and lead productive lives.

• **BASIS ADVISOR:** Andy Granda • **ON-SITE MENTOR:** Shawn Youngstedt, PhD (ASU) and Dr. Waiz Wasey (ISIA)  
• **LOCATION:** Arizona State University, Edson College of Nursing and Health Innovation and The Insomnia and Sleep Institute of America

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**HAVEN S.**



**CONCUSSIONS IN AMERICAN FOOTBALL: AN INQUIRY INTO THE EVOLUTION AND EFFECTIVENESS OF CURRENT PROTOCOLS AND SAFETY MEASURES IN THE NFL**

**SUMMARY:** A wide receiver runs across the football field trying to catch the ball thrown at him. He reaches out and extends his arms to make the catch, but just as he secures the ball, he is taken down by a 6-foot, 250-pound defender. He drops to the grass and lays there drifting in and out of consciousness due to contact to the head. Medical teams rush to the field to help. This is a common occurrence during football games. Concussions, a type of traumatic brain injury that is caused by hard or repetitive blows to the head, have been and still are one of the most common injuries in American tackle football. Concussions cause the brain to swell and can lead to Chronic Traumatic Encephalopathy, a neurodegenerative disease found in many football players with a history of repeated concussion injuries. Over time, the NFL has been implementing and evolving new protocols and safety measures to prevent concussions and ensure safety for football players. To address this topic and look at how concussion preventions have changed over time in the NFL, I looked at various forms of media, such as scholarly articles, journals, documentaries, and case studies of multiple individuals known to have Chronic Traumatic Encephalopathy caused by concussions. I discovered how the NFL has improved its protocol and safety measures and if the current protocol and safety measures are enough.

• **BASIS ADVISOR:** Madeline Nicholls • **ON-SITE MENTOR:** Mike Lowry • **LOCATION:** PHD Football



# Goodyear SENIOR PROJECTS

**BASIS GOODYEAR**

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