



ABSTRACTS FOR POSTER PRESENTATIONS

Posters will be on display throughout the Showcase – come talk to student presenters at the following sessions:

Poster Session #1: 6:30-7:15 PM (A session posters); Poster Session #2: 7:15-8:00 PM (B session posters)

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1A	AUIDS301	Alexa Bodner, Rowan Corry, Hanna Orge, Tori Van Bavel, Jordan Zimmerman	Project tight knit	This poster is apart of our AUIDS 301 sustainability in Camrose course. Our topic focuses on the representation of social sustainability involving the collaboration of university students and seniors in the Camrose community. We will represent past and existing programs that represent our ideas.
1B	AUIDS301	Alexandra Asuncion, Wetsat Bako, Gavin Hu, Olya Klepacheva, Meadow Munroe	Public and active transportation in Camrose	Methods of transportation in Camrose are the focal point of our project. Through research, we will show how Camrose is a car-dependent city. This caused us to look into both the public and active systems of transportation in the city. To do this, we identified key issues the city could potentially suffer from as a result of lacking methods of transportation. We will thoroughly examine the Camrose Community Bus and attempt to spread the word about it during this exhibition. We will also identify what means of active transportation could potentially be altered or added to the city.
2A	AUIDS301	Brittany Determan, Wenwen Lu, Kisum Lyu, Sarah Singular, Brooklyn Swain	Get Gardening	Many people are unaware of the benefits of gardening and how easy gardening actually is. In our project we provide a step by step outline of how to garden and answer frequently asked questions and concerns, while also discussing the many benefits of gardening.
2B	AUIDS301	Brittany Holowachuk, Daniel Moody, Delaney	Greenspaces: the key to making cities happy, healthy and sustainable	This presentation provides an analysis of local greenspaces located in Camrose, Alberta. Generated by third-year Augustana students Brittany Holowachuk, Daniel Moody, Delaney Stelsmachuk, Kassidy Ottenbreit and Marc Parma under the guidance of Dr. Greg King, the primary goal of this project seeks not to advocate for more trail systems, more parks, or larger

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		Stelmaschuk, Cassidy Ottenbreit, Marc Parma		greenspaces within Camrose. Instead, we strive to inform Camrosians about the potential sustainable benefits of using the current assets already in place by employing promotional marketing strategies inclusive to interviewing, survey creation, and poster formation. We aim to highlight the project's problem recognition phase, alongside a summary providing prospective feedback for implementation. Ultimately, this collaborative effort places a joint focus on showcasing the potential advantages of sustainable living with respect to the three pillars of sustainability while keeping in mind the physical and mental health benefits that may transpire with increased greenspace utilization.
3A	AUIDS301	Claire Bevan-Stewart, Caitlin Jordan, Pia Vij, Hope Zimmerman, Josie Zimmerman	Let's Look at Local!	By building on citizens' knowledge about locally sourced products, the community will have the ability to make lasting impacts that can be appreciated by future generations. We will try to portray the benefits and accessibility of foods sourced around Camrose. We hope people will gain knowledge about how to form more mindful lifestyle choices about local food. By spreading awareness of this topic, the future of Camrose will be very bright. This includes the ability for Camrose to introduce hydroponics into the local repertoire which will increase locally sourced produce.
3B	AUIDS301	Daniel Ajayi, Brooklynn Bouillon, Aleya Lotzien, Iryna Netesina, Selah Ryan	Camrose Recycling	We partnered with the Camrose Green Action Committee that focuses on proposing and implementing new green initiatives to create a sustainable city and selected recycling to focus our attention on. The purpose of this project is to identify and consolidate Camrose recycling initiatives and to hear from residents and community partners about the successes and challenges to recycling. This would promote education about what can be recycled and where, leading to increased awareness and participation in existing recycling efforts. By raising public awareness of the advantages of recycling, along with how to recycle in Camrose, we can enhance the recycling system to reduce waste generation and pollution, protect natural resources, save energy, and generate economic benefits. This poster has been developed to create a centralized resource for recycling information such as where the recycling materials go after being dropped off, why recycling is important, describing Centra-Cam Social Enterprise as well as its programs, and gives details on the responses we found by engaging with the community.
4A	AUIDS301	Destiny Hobbs-Stewart, Adrian Lam, Anurika Onyenso, Meghna Upadhyay, Lisa van der Woude	Why improvement of wastewater is essential for sustainability in Camrose	Wastewater, the murky residue of our daily activities, presents a daunting challenge to modern societies. In Camrose, wastewater is currently being treated in a lagoon system, however, a new state of the art wastewater treatment plant is under construction. In our project, we aim to address how Camrose can improve wastewater, by connecting what the City has already done to reduce wastewater to what individuals can do to reduce their wastewater. In this project, we had the opportunity to visit the Camrose wastewater treatment plant while speaking with Jeremy Enarson the city engineer, connected with the Green a\Action Committee Members Rob Hill and Joy-Anne, and had meetings with a local plumber and the GF foundation. As a result of the information we obtained our group has proposed a series of initiatives that aim to tackle this issue head-on, through a multi-faceted approach that targets education, awareness, and individual participation. The initiatives we took included the booster article, the website deliverable, the academic paper, and finally our docu-series on the youtube channel we created. We can conclude that although the city is

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				doing things to improve the wastewater in Camrose, we hope that our project will provide a guide for the citizens of Camrose to aid in the improvement of wastewater.
4B	AUIDS301	Frank Dion, Karylle Mata, Kiera Machin, Angelina Lau, Parmida Beedle	Repairing Water Quality in Riparian Areas	Riparian areas are one of the most important aspects of maintaining quality water and healthy ecosystems; however, they are often ignored. Our poster, "Repairing Water Quality in Riparian Areas", visually informs Camrose residents about the land surrounding bodies of water –or "riparian areas". Having conducted an extensive literature review on the topic and synthesised our research for writing articles for the Camrose's Booster and Sustainable Camrose website, our poster serves as a reliable source for outlining the significance of riparian areas in the three pillars of sustainability: economic, social, and environmental. Briefly, riparian areas provide benefits such as flood control, habitat for fishing and hunting industries, and opportunities for recreation and tourism. They also offer opportunities for outdoor activities, education, and improving mental and physical health, boosting the social welfare of Camrose residents. Riparian areas contribute to maintaining healthy ecosystems by filtering pollutants, providing habitat for various species, and regulating water temperature for aquatic life. There are very few existing programs in Camrose that raise awareness about riparian areas, why they are essential, and how to maintain them. Using accessible language and design, our poster attempts to fill this void, providing individuals of almost any age and ability with simple, cost-effective actions they can take to support maintaining the health of Camrose's riparian areas - and by extension, helping to make Camrose's water supplies sustainable.
5A	AUIDS301	Janiel Dillon, Shaelynn Graumann, Macy McDonald, Tessa Reed, Keira Slusarczyk	Meal planning- A simple sustainable practice	As third-year students at Augustana, we have been tasked with coming up with an innovative way to make Camrose a more sustainable city. Our team, "Food for Thought," has decided to address the issue of food waste through meal planning. Of this wasted food, 31% is organic and can be avoided through individual actions. As food goes from farm to landfill, vast amounts of water and energy are wasted, thus demonstrating the need to reduce our waste and be more conscious of our choices. Food waste can be reduced through meal planning because it decreases the risk of purchasing more food than you can eat. Our project includes information about the personal and environmental benefits associated with meal planning, such as saving you money, reducing stress, and decreasing food waste.
5B	AUIDS301	Kyle Cote, Gervi Dorado, Berenda Helmus, Aman Leung, August Ross	Rain Water Collection Initiatives	We aim to reduce water usage in Camrose through this initiative by encouraging rainwater collection. Our goal is to reduce the strain of water utilization rates that Camrose currently demands from the Battle River Watershed and Driedmeat Lake. This is important because of the uncertainty regarding the future of our water source. Driedmeat Lake is only fed by prairie runoff and snow melt, and is not glacier fed. We connected with the Green Action Committee of Camrose, interviewed local citizens that already utilize rainwater collection, and met with the Battle River Watershed Alliance. The feedback given allowed us to come up with three initiatives that we feel are essential to work towards sustainability in Camrose.
6A	AUIDS301	Lexi Brantner, Adachukwu Chimaobi, Brayden Dickau, and Jacob Christensen	Solar Panels	The growing rate of Alberta's solar energy is the largest renewable energy source in all of Canada. With a monthly 2% increase in solar panel users in the province, the time to switch to solar energy has never been better. This presentation intends to address the benefits of solar energy in terms of reducing one's home electricity bill by utilizing the use of solar panels. Incorporating this technology can orient us toward a more sustainable future with less reliance

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				<p>on the electrical grid. We collected data from local solar panel users on their daily, monthly, and yearly electrical production in kilowatt-hours to see their reduced grid electricity consumption as well as electrical utility bills to see the reduced costs with the investment of solar panels. Additionally, we reached out to a local installation company, Solar Harvest, that provided useful context into the newest technological advances in the efficiency of solar panels. Lastly, we gathered data from local energy providers of Camrose Energy regarding the average price of solar panel installations and the total number of installed solar panels throughout the entire province divided by county and living area (village, town, city). We were also provided with resources of provincial and municipal government incentives to help residents financially to get started with solar energy to help with subsidizing the overall installation costs. The growing popularity of solar energy in Camrose has the potential to be a top solar energy source due to its high sunlight radiation during its warm seasons. The more solar energy we can produce, the less we burn fossil fuels, and the more economic opportunity in electrical revenue is kept in the community rather than transporting energy from over great distances.</p>
6B	AUIDS301	Priscilla Adebajji, Anjola Aina, Aarushi Gupta, Arpandeeep Kaur, Nicole Roy,	A Deep Dive into Opportunities for Sustainability at Camrose High Schools	<p>We wanted to examine the extent to which opportunities for learning sustainability exist at Camrose high schools. How do teachers implement sustainability? How do school boards promote and support sustainable initiatives? What can we do to support Gen Z? We interviewed a teacher at Our Lady of Mount Pleasant and administered surveys to parents, teachers, and students to gauge individuals' perceptions of support for sustainability programs. Ultimately, our findings indicated that this support is minimal. Initiatives before COVID-19 are gone, and there is no indication in curricula showing youth are learning about sustainability. Based on our findings, we concluded that to prepare individuals for the next generation, we must increase systemic support so sustainable initiatives can become long-lasting.</p>
7A	AUIDS301	Sydney Abel, Luke Beattie, Cailyn Katchur, Isabel Levesque, Hannah Resch	Ecoscaping for everyone: building a sustainable yard	<p>While climate change is a topic that requires attention and action on a government level, individual action is just as critical. Citizens are surprised to know that they can contribute dramatically to the reversal of climate change simply by implementing sustainable practices around their homes and in their yards. Commonplace monoculture turfgrass lawns pollute water, limit habitat and wildlife diversity, and have high input costs. As the population of the City of Camrose continues to grow, its water source may not be able to efficiently sustain the growing population. Solutions to these problems exist but are often published in scholarly journals, which the general public is either unaware of or does not have access to. From January-April 2023, we aimed to increase public awareness regarding individual water conservation actions by researching and producing publicly available resources. With input from the Camrose Green Action Committee, we formulated several works for public viewership: an article for the Camrose Booster, a deliverable post for the Sustainable Camrose website, as well as a poster and presentation at the Augustana Student Academic Conference. These works highlight five major themes that Camrose residents can implement to sustainably ecoscape their yard, including water conservation, knowing your site, mimicking nature, saving money, and building your soil. These themes each add up to a term we have called</p>

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				“ecoscaping,” which we have defined as the integration of sustainable practices into pre-existing landscaping techniques.
7B	AUIDS301	Yousif Ismail, Morgan King, Brooklyn Saretsky, Fallon Shelton, Alix Stannard	Camrose Composting	The inorganic cells of the Camrose landfill are closing this year due to not being able to economically compete with surrounding landfills. The city will be implementing a transfer station to transfer the waste Camrose produces to the Edmonton and Red Deer landfills. When residents participate in composting practices, the amount of waste having to be transported decreases which in turn would decrease the transporting fees, potentially saving the residents of Camrose money. Participating in composting can be a simple process consisting of placing the waste that you already produce in a separate bin and letting the city do the rest of the work, or if you are up for the task, you can start your own composting pile at home. Regardless of which way you choose to participate in composting, the process has many positive effects on our environment and community which include reducing greenhouse gas emissions, reducing waste entering the landfill, providing nutrients to the soil and many more. With increased awareness of the program there will be an increase in participation in Camrose, helping Camrose become a more sustainable city!
8A	AUIDS401	Rida Ahmed, Sheyne Baker, Natalia Friesen, Jessica Leeson	Tile Together	With the lasting effects of COVID-19 sticking with us, we have lost our social connectivity with one another. Using the Cultivating Community Grant to support our project we have created “Tile Together”. A 10 week community engagement project that brings together the Camrose community. This project brings together those from all walks of life through participation in various art events. All cumulating in a day spent creating a community inspired mosaic for all to enjoy.
8B	AUIDS401	Airk Masse, Adrian Caceres, Tadgh Dalton, Chase Opsal	Camrose Pen Pals	Our group will be presenting a poster about the faux grant project we have created over the course of the semester. This project is a three year pen pal program that seeks to increase community connectedness in the city of Camrose. The first year will connect seniors and middle schoolers, the second rural and urban residents, and finally the third year will connect new residents of Camrose with long-term residents. With the recent COVID outbreak we feel that this is a good way to connect people who may be uneasy about spending direct time with strangers. Communication through an indirect medium such as a letter will hopefully allow participants to ease into social interaction. In a world where people are growing continuously isolated projects such as this are essential to a healthy and connected community.
9A	AUIDS401	Alex Popiel, Anna Renner, Carly Rombs, Danielle Strayer	Camrose Community Chase	Throughout AUIDS 401 (Advanced Integration Project), we were tasked with creating a project that aligns with the Cultivating Community Connections Grant, which addresses social issues of loneliness, isolation, and disconnection. The purpose of the endowment is to assist groups in combating these issues. We proposed ‘Camrose Community Chase,’ a biannual event where teams of 4 will complete 12 activities. Our innovation will increase a sense of community among Camrose residents through partaking in activities that engage diverse community members with local businesses. Next, through random assignment of teams, we will facilitate new opportunities for individuals to interact with individuals outside of their circle, promoting a larger social network. Finally, we will inspire participants to return to businesses after the event by providing incentives such as coupons or discounts. Ultimately, we envision a project where individuals from all backgrounds and abilities can participate and have fun.

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9B	AUIDS401	Beau Alstott, Taylor Olson, Jonas Riel-Longworth, Ryan Symington	Camrose Community Connections	Camrose Community Connections is a social intervention program with the goal of creating lasting connections in our community across a wide diversity of ages and cultures. Programming for this project includes four events per year, one in each season, and include a variety of themes ranging from physically involved activities to more relaxed events where people can sit and chat. From beverage and food tasting events, to performing arts and cross-country skiing, there is something for everyone to enjoy and build enduring relationships around.
10A	AUIDS401	Gift Akinloye, Lauren Cardinal, Logan Oslund, Cale Scotton	Camrose community mentorship program	The purpose of this project was to create an intervention that promotes social connection, inclusion, and community well-being. With this aim, we propose a community mentorship program in which mentors will be able to pass on valuable skills and information to individuals or a small group. Specifically, our program will involve gardening and sewing mentorships. The gardening stream will leverage existing community resources through the use of community garden plots. The sewing stream will focus on the creation of ribbon skirts, allowing people to expand their social circle beyond those that have a similar ethnic background. Based on psychological research, our hope is that people will expand their existing circle and create new relationships founded on common interests. What's more, there is ample evidence that participation in creative endeavours, such as gardening and sewing, supports mental well-being. In a world that is increasingly out of touch with nature and with neighbours, this program will provide an opportunity for people to develop meaningful connections regardless of race, ability, gender, or religion.
10B	AUIDS401	Aashna Mann, Tristen Mckenzie, Fatima Navarro, Yixiao Zhang	Fostering community and socialization through film	The Camrose Community Film Club is a fictional project created to address loneliness and offer solutions. The project is targeted towards people who need a nudge to participate in their community and build connections with new individuals. Our project details different ways that individuals will get involved in the community and build relationships. Monthly events are open to the public, which include a film screening, snacks, drinks, and events that facilitate discussion and connection.
11A	AUBIO 419	Madison McNalley	The Effect of Radio Broadcasting on Normalizing Weather Variation Due to Climate Change	The media is a powerful tool for influencing public perception and attitudes toward topics; however, more research needs to be done to explore the significance and impact of how the weather is reported via radio broadcasts. This study explored radio show hosts' effect on normalizing weather extremes caused by climate change. Investigating local radio stations could identify their potential impact on local listeners. Data were collected from radio broadcasts, including radio stations CBC Edmonton 91.4 FM and CFCW 840 AM. Data were analyzed by qualitative coding by tone and keywords, which were then sorted as negative, neutral, or positive. Stations were compared on the occurrences of type of tone and keywords used on days with temperatures above or below the historical average. On days below the historical average, the tone for CBC was neutral but varied for CFCW, while the keywords were negative for both stations. On days above average, tone varied between neutral and positive, while keywords were all positive for CFCW and positive and negative for CBC. When viewers are exposed to local television weather forecasts, viewer perceptions of extreme local weather are increased, further increasing awareness of the impacts of climate change and their

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				willingness to support mitigation. This more profound understanding of the impacts can educate viewers on the importance of action to combat it.
11B	AUBIO 419	Emily Mahon	Play Clean Grow: Tracking Seed Species within Elk Island National Park	Invasive species often negatively affect any environment they reside. A variety of such plant species can be found in Alberta, such as scentless chamomile (<i>Tripleurospermum inodorum</i>) and various thistle species (<i>Asteraceae</i>). The Play Clean Go program aims to prevent the spread of such invasive species by reducing the number of seeds entering any affiliated organizations' natural areas. This research study worked in collaboration with Elk Island National Park's Play Clean Go program to identify and analyze the species composition of seeds collected at the heads of their trail systems.
12A	AUBIO/EN V 459	Jacqueline Kublik, Amelia Murray, Madi Robinson, Lucille Wang	Cooling off: How shade is influencing olive ridley sea turtles	Olive ridley sea turtles are considered vulnerable and their populations are decreasing. Therefore, understanding the optimal conditions for their survival is imperative. During our experiential trip to Osa Conservation in Costa Rica, our goal was to compare the sand temperature between shaded and non-shaded areas in Osa's turtle hatchery and on the neighboring beach. Additionally, we aimed to answer how differences in shading affect the incubation length and rate of hatching success of olive ridley sea turtles by analyzing previously collected data from Osa Conservation. Our results show that Osa Conservation's hatchery is providing lower sand temperatures than the corresponding beach. Further, in the sun zone of the hatchery, higher temperatures may contribute to lower hatching success rates in Osa's hatchery. However, greater incubation lengths in the sun zone do result in similar hatching success rates as in the shade zone. With increasing sand temperatures due to climate change, shaded hatchery conditions could mitigate skews in sex ratios in olive ridley populations. Information from the present study could help inform Osa Conservation of the efficiency of their hatchery to better monitor future hatching of sea turtle eggs and sex ratios.
12B	AUBIO/EN V 459	Dana Eliuk, Ben Nawrot, Sami Siegle, Breanna Storch	Canopy cover surrounding mature Ajo trees and its influence on understory vegetation	The Ajo tree is an endangered species, found primarily in tropical old-growth forests in Central America. The Ajo has a slow growth rate, and is considered economically valuable because of its durable hardwood. Therefore, understanding the optimal environment for this tree and the surrounding environment is necessary. During our research trip to the Osa peninsula, Costa Rica, our main inquiry included determining if there was a correlation between canopy openness and understory vegetation cover surrounding mature Ajo trees. We measured the characteristics of the environment around mature Ajo trees including canopy openness, seedling and sapling abundance, percentage of understory vegetation cover, as well as the diameter at breast height of the mature trees. We found no significant correlation between canopy cover and understory vegetation relative to the aspect of mature Ajo trees.
13B	AUBIO/EN V 459	Lili Axten, Jenna Miller, Sam Nawrot, Jinxuan Cui	Early bird gets the worm: Species richness of Costa Rican birds is highest in the morning.	Tropical regions are known to have high levels of biodiversity, due to the variety of habitats, suitable climate, and plant diversity (Kricher 2017). Costa Rica is no stranger to this trend of high biodiversity, hosting around 850 different bird species (Garrigues and Dean 2014). There are more than 460 species of birds on the Osa Peninsula alone (OSA tourism [accessed 2022]). Our study explored how the time of day influences the bird species' richness. Our study focused on the trails located within the primary forest surrounding the Osa Biological station. Point counts were conducted two times a day, alternating time periods from January 8th-13th utilizing both auditory and visual identification. We found the AM group is significantly

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				different from the MID and PM groups for species richness with no significant difference between the MID and PM groups.
13A	AUMAT328	Hrittijia Bhattacharjee, Michelle Duarte Cuartas, Karylle Mata	Security in Random Number Generators Design	Random Number Generator or RNGS are hardware devices or software programs which take non – deterministic inputs in the form of physical measurements of temperature or phase noise and generate unpredictable numbers as its output. The issue of random number generation is crucial for the implementation of cryptographic systems. Random numbers are often used in key generation processes, authentication protocols, zero knowledge protocols, padding, in many digital signature and encryption schemes, and even in some side channel attack countermeasures. For these applications, security depends to a great extent on the quality of the source of randomness and on the way this source is exploited. The quality of the generated numbers is checked by statistical tests. In addition to the good statistical properties of the obtained numbers, the output of the generator used in cryptography must be unpredictable. In this poster, we will discuss practical aspects of a true random number generator design.
14A	AUMAT328	Sandile Ngwenya, Priscilla Adebani	The Role of Cryptography In Cryptocurrency	Our project looks into the role that cryptography plays in a more modern tool for online transactions; cryptocurrency. We explore algorithms that help secure transactions namely, Digital signatures and Hash Functions and discuss their relevance in cryptocurrency as well as highlight the drawbacks of those algorithms. Finally we take a look into the future, with quantum computing and its role in cryptography, cryptanalysis and cryptocurrency.
14B	AUMAT328	Jacob Baxter, Willis Kneeland, Warren Peters	A faster and more realistic "flush+reload" attack on AES	Not provided
15B	AUMAT328	Daniel Kirivita, Daniel Krivchun, Logan Oslund	Smart card hacking	In our captivating presentation, we delve into the intriguing world of smart card hacking, shedding light on its diverse applications and robust countermeasures, all while adhering to sound cryptographic principles. Smart cards, the versatile and integral components of our modern lives, are embedded in computers, cellphones, payment cards, and a myriad of other cutting-edge technologies that facilitate the seamless exchange, storage, and transmission of critical information, such as identification, authentication, payments, and access to services. Recognizing the paramount importance of smart cards, we underscore the necessity for them to be accessible, efficient, and above all, secure. Our discussion will explore the various types of smart cards available, weighing their unique advantages and disadvantages, and delve into the multifaceted aspects of smart card security, including the software and hardware attacks that threaten them. To conclude, we will address the pressing challenges smart cards currently face and those looming on the horizon. Furthermore, we will highlight the extraordinary functionality and benefits offered by smart cards, celebrating the remarkable advancements they have brought to our increasingly connected world.
15A	AUSCI115	Ajwa Niaz, Haedyn Castle, Audrey Boucher, Brianna Winiandy-Munch	to be determined	Introduction: Redworms, a type of decomposer, are important in many ecosystems and their presence in soil usually indicate a healthy environment. Several environmental factors like rainfall (acid rain) and temperature can alter the pH of soil, affecting the redworm's health, resulting in an unhealthier soil. While redworms thrive in pH levels between 6.5 and 7.5, we

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				<p>want to test how average, low and high pH levels affect redworm reactions and what those reactions say about the health of the worms. With this information, we will hopefully be able to determine which pH levels are safest and which are most challenging to the worm's health. Objective: We were led to pursue this question when looking at a previous lab that had us using different soil that had varying levels of pH values. We want to know what range of pH creates the strongest reaction in the worm's movement to touch, and what does this reaction say in relation to the health of the worm. Our formulated hypothesis is that since worms thrive in a neutral environment, as the acidity of the soil increases (for example to a pH value of 4) the <i>Eisenia fetida</i> will have a strong reaction due to the discomfort they experience due to inability to adapt quickly.</p> <p>Methodology: In this study, we estimated that if the acidity of a neutral environment is increased the <i>Eisenia fetida</i> will have a strong reaction due to the discomfort they experience due to inability to adapt quickly. To do these we used five worms and slowly increased the acidity of plant soil by adding HCl.</p>
16A	AUSCI115	Masud Said, Mmesomachukwu Nnadi, Zhijian Wang	The impact of temperature on both the physical and psychological behavior of pillbug	<p>This study seeks to investigate the impact of temperature on both the physical and psychological behavior of pillbugs. Through controlled experimentation, a group of pillbugs will be exposed to different temperatures, ranging from 10°C to 40°C, and observed for behavioral changes. The research question is "How does temperature affect the physiological and psychological behavior of pillbugs?" The study will use a water-filled bucket to control the temperature, with a thermometer to ensure accuracy, and data collected will be analyzed using statistical software to determine the significance of the observed effects. This research aims to fill a knowledge gap on the impacts of temperature on pillbugs and has broader implications for understanding the effects of environmental change on animal behavior and physiology. The findings could provide valuable insights into conservation and management strategies amidst climate change.</p>
16B	AUSCI115	Caelum Hartman, Treston Moisey, Mary Pelletier, Jeremy Wiebe	Effects of moisture on mealworm phenotypic traits	<p>Introduction: Studies have shown that insect pests are known to be attracted to moist sources, this includes <i>Tenebrio molitor</i>. This can be seen in experiments with the insect's attraction to fresh vegetables compared to dry and aged ones. However, the research on <i>T. molitor</i>'s phenotypic behaviours is limited and motivated this experiment. A research question was created after analysis of different experiments and noting mealworms' necessity for water. The tested question is as follows: "How do different moisture levels (0, 1.5, 3, 4.5mL) affect the activity of <i>T. molitor</i>?". The formulated hypothesis for this experiment was that due to the necessity of water within the habitat, <i>T. molitor</i> would burrow at its preferred moisture level. The insect would remain above the surface for other moisture levels since excess water can produce mould unsuitable for its environment (Sialis 2016).</p> <p>Materials and methods: Observational analysis was used to determine the <i>T. molitor</i> phenotypic behaviours in this experiment. Four adult <i>T. molitor</i> were placed in four different</p>

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				Petri dishes with varying amounts of moisture. Phenotypic traits such as coiling, uncoiling, burrowing, locomotion, and no movement were observed and recorded.
17A	AUSCI115	Boris Kuljanin, Bryce Boan, Jorden Wiebe, Alix Stannard	The effect of light on CO ₂ production in pill bugs	Our study examined the effect of light exposure, or lack thereof, on the activity of pill bugs (<i>Armadillidium vulgare</i>) through the measurement of CO ₂ production. The study utilizes a total of 15 pill bugs divided into one control trial and two experimental trials. The duration of each trial will consist of 2 minutes in the room lighting, 1 minute in the test condition for acclimation, followed by 3 minutes of measurement in the test condition. The experimental trial will consist of exposure to bright light through the use of an iPhone and exposure to darkness. The acclimation time, body weight of the pill bugs, measuring period, distance between the light source and the subject, and temperature will all be controlled to limit the margin of error. We aim to identify in what condition, either light, dark or room lighting, pill bugs are the most active and produce the most CO ₂ .
17B	AUSCI115	Katelynn Baska, Adam Duchscherer, Amber Hutton, Chad Nichol	Metabolic rate and the influence of soil moisture on the survival of <i>Armadillidium Vulgare</i>	<p>Introduction: Decomposers are essential to an ecosystem by allowing nutrients to regenerate into the environment. Isopods, specifically <i>Armadillidium vulgare</i> (Pillbugs), are decomposers that have been documented to prefer moist soil types due to their behavioural tendencies and biological gills that need to be kept moist to function. It has been undocumented whether the moisture of the soil they reside in influences their ability to decompose matter. Therefore, the question has been posed: Does the moisture level of soil influence the metabolic rates of <i>Armadillidium vulgare</i>? From past literature, it has been documented that terrestrial crustaceans decrease activity to conserve water, therefore the following hypothesis has been produced: <i>Armadillidium vulgare</i> will exhibit a decreased respiration rate when the moisture levels of the soil decrease.</p> <p>Materials/Methods: This undergraduate study measures the mass-specific respiration rates of <i>A. vulgare</i> using a CO₂ apparatus when subject to different soil moisture levels. Respiration rates are assumed to be indicative of metabolic and in extension, decomposition rates for <i>A. vulgare</i>. A control treatment was used to correct the value from the spontaneous CO₂ production for the soil. Six ranges of moisture levels for a sample size of 5 <i>A. vulgare</i> were tested.</p> <p>Results and Conclusion: Since the experiment has yet to be performed, no results have been recorded at this time. Any conclusive findings will be stated after the research is conducted.</p>
18B	AUSCI115	Isaac Boddy, Siddharth Kumaria, Victoria Nwachukwu	Maze completion of hot and cold pillbugs	Numerous studies have been conducted on the regulation and response to internal and external temperatures of crustaceans (Refinetti 1984), however the consequence of environmental temperatures on the movement of isopods has been largely disregarded. Studies were made from the observance of pill bug (<i>Armadillium vulgare</i>) maze completion under two temperatures representing cold and hot environments, with an added control group representing room temperature. The gathered results from this study start building towards the general lifecycle and lifestyle of <i>A. vulgare</i> observed in Alberta, Canada, wherein the temperature fluctuates regularly. Regarding limitations surrounding this study, the conditions are representative of extreme hot and cold, disregarding moderate temperatures. Contrarily, a study without this limitation would derive greater comprehensive results regarding temperature effect on <i>A. vulgare</i> . Subsequently, future experiments may consider

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				observing <i>A. vulgare</i> reproduction under varying temperature environments to see effect on birth rates, gender diversity and survival rates. Although limited, this experiment is a great beginning into climate research on pill bugs, further connecting to isopods and crustaceans.
19A	AUSCI115	Bela Benjamin, Stephanie Ejezie, Grayson Kuhne, Chigozie Orakwe	Exploring the relationship between light intensity levels and mealworm behavior	We observed that mealworms are very sensitive to light given how they react when exposed to light; they look for the nearest dark place and move there immediately. So we will address the question: How do varying light wavelength levels influence the habitat preferences of mealworms? To answer this we are going to perform an experiment that will have 6 conditions in which we are going to test the mealworms. These conditions are The control, tissue paper, black construction paper, red film, green film, and blue film. For each condition 2 trials will be completed. For trial 1 the left side will be covered and the right side will be uncovered and for trial 2 the left side will be uncovered and the right side will be covered; this way we will see which side the mealworms prefer and how the number of mealworms increases or decrease on either side as the wavelength of the different colors of light increases. The experiment design was chosen based on previous research on mealworm behavior and is expected to provide insight into their natural habitat preferences. Understanding these preferences will help inform the management and conservation of mealworm populations in captivity and the wild. We hypothesize that the habitat preference of mealworms should be influenced by varying light wavelength levels. We predict that as the light wavelength level increases, the number of mealworms on the darker side increases while the number of mealworms on the brighter side will decrease as mealworms are known to be nocturnal.
19A	AUSCI115	Chance Foster, Korbin Hafso, Aidan Peake, Amy Singh	Effect of soil pH on red worm (<i>Eisenia Fetida</i>) CO2 production and behaviour	The world around us is constantly changing. New technologies involved in farming, waste management and treatment of hazardous materials are constantly being revolutionised. A large reason for these innovations is a worry about changing pH's of our earth's soil, and the effect these changes may have on many organisms. With this idea in mind, the research we are conducting is testing how exactly red worms (<i>Eisenia fetida</i>) respond to several different levels of pH. We see this research as crucial to understand how pH changes may impact our environment, and highlight the importance of new innovations to protect these hard-working decomposers. Our first step was to decide what type of pH range red worms are used to, as to ensure we are not varying the pH to a dangerous level. From this research, we decided to test 4 separate pH's: 5, 6, 7 and 8. For our acid and base solutions, to recreate a realistic soil pH environment, we will obtain pine needles from the greater Camrose area, and lemon juice which bears acidic properties. Each pH will be tested with 3 individual worms, and then a group of 3. This will allow us to view how worms respond both in groups, and by themselves. We will create 5 different trials for the Redworms to be in and observe their mass movement and activity. To do so we will utilise a CO2 meter tracking the total CO2 output produced by movement in the animal, and output per mass of the organism. Control trials will have pH ranging from 4-9 to recreate the variety of soil pH's found in various Red Worm environments due to infrastructure and pollution. The 5 trials will be conducted and data obtained and presented in the form of a figure presented at SAC to demonstrate the effect of minute soil changes in relation to organism behaviour.

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19B	AUSCI115	Emmanuel Okusanya, Alexander Propst Corrales, Amelia Williams	Alternative waste disposal of Canola Mash utilizing Red Worms and Mealworms	<p>Mealworms and red worms are some of the world's most diversified consumers, meaning that the species are prone to eating anything and everything. So it led to us creating an experiment testing whether worms would be able to process and make fertilizer off of canola mash without being harmed by its antinutrients. If the worms are capable of producing fertilizer from canola mash then we would have a perfect alternative method of disposing canola mash in a sustainable way.</p> <p>Methodology: In this experiment we plan to allow the worms to acclimatize to their new environment by providing a rest period. In a habitat designed to fully meet their needs. The enclosures will be at a maintained temperature and humidity to ensure the worm's comfort. With only deviation of treatment being it's provided nourishment.</p> <p>Results:</p> <p>For this experiment, we hope that the results will support the hypothesis that worms can be used by canola plants to minimize their waste and promote agricultural sustainability. If the worms are indeed able to consume the canola mash and all its toxins, then the method can be adapted by canola plants all over the world. The worms in turn can be fed to different animals, creating a self-sufficient agricultural system.</p> <p>Conclusion: These worms are the perfect organisms for eating anything so if they do consume the canola mash and are able to produce fertilizer then there will be an alternative disposal for canola mash that doesn't generate much byproduct.</p>
20A	AUSCI115	Danielle Michiels, Dominika Nawrocki, Linnea Solowan	Food motivated behavioral pattern of pill bugs investigated through a T-shaped maze	<p>Study Organism: Pillbugs (<i>Armadillidium vulgare</i>)</p> <p>Research Question and brief explanation: How does the influence of different fruits affect the rate pill bugs (<i>Armadillidium vulgare</i>) navigate a T-shaped maze? Will the presence of different fruits affect navigational skills (ie. preference)?</p> <p>Hypothesis: As pill-bugs are attracted to high concentrations of moisture, when navigating the T-shaped maze, subjects will have preference for oranges due to the high water content in comparison to other fruits presented – kiwis, apples, strawberries.</p> <p>– volatile oils – fragrance</p> <p>- Apples, kiwis, strawberries, oranges (least to most volatile oils)</p> <p>Experimental Procedures:</p> <p>- Brief methods:</p> <p>- Experiment outline: The pill bugs will be subjects of three different rounds of testing. The first round will have apples vs oranges, then the second round will have kiwi vs strawberries. The chosen fruit of each round will be paired together for the final outcome.</p> <p>- Control: Place a piece of carrot in the maze and see if the pill bugs gravitate towards the food. Should subjects be not make contact with the carrot, cut off time will be 5 minutes</p> <p>- Stimuli: Have subjects run the maze, individually, with 4 pieces of different fruit at each end, and time how long it takes for the subjects to make contact with the fruit, and see which fruit they prefer. Should subjects not make contact with any fruit piece, cut off time will</p>

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				<p>be 5 minutes</p> <ul style="list-style-type: none"> - Record behaviours should the subjects not complete the maze - We will observe the behaviours of each pill bug going through the maze - How are you addressing animal care: thin layer of damp soil lining the bottom of the maze, handle with care (don't drop them), store the unused subjects in a petri dish with damp paper towel and a carrot piece to keep them calm, we will take care to not subject the pillbug to undue stress. - Levels of stimulus: apple, kiwi, orange, strawberry (various levels of moisture in each fruit) - Dependent variable: response to stimuli→ how long it takes pill bug to make contact with the fruit - Independent variable: type of stimuli→ various pieces of fruit - Controls: type of maze, types of pill bug, testing environment, timer used, where the food will be placed, placement of pill bugs (how far the pill bugs will be from each piece of fruit) - Sample size: 4 pillbugs - Acclimation period: during the experiment observation will begin as soon as the pillbug is put in so no time of acclimation is required or allotted for. - Length of observations: each pill bug will be placed in a maze with various pieces of fruit (apple, orange, kiwi, strawberry), the fruit picked will move onto the next round until a "winner" is chosen (tier ranking system) - Phenotypes to be observed: mass, length, width
20B	AUSCI115	Katalin Hemperger, Aiden Krebs-Elaschuk, Flora Nguyen, Taylor Roberts	Behaviours of red worms (<i>Eisenia fetida</i>) towards differing soil pH.	<p>Acid rain has become an increasingly major environmental issue on the planet. This has a significant impact on soil ecosystems as the common red worm (<i>Eisenia fetida</i>) favours a rather neutral pH range of 6-8. In our study, we will be testing <i>E. fetida</i> and their abilities to recognize three pH levels – 4, 7, and 9 (altered by lime or charcoal), in potting soil to avoid life-threatening environments. We hypothesized that since <i>E. fetida</i> are accustomed to living conditions with a pH between 6 and 8, they will exhibit behaviours of staying on top of potting soil when placed in extreme pH conditions (4 and 9). Three trials of three worms will be conducted, and behaviours of burrowing or not burrowing will be recorded after a set time of 5 minutes after being placed in the novel soil; this allotment of time indirectly indicates whether <i>E. fetida</i> are able to recognize whether or not they are in a suitable environment. <i>E. fetida</i> possessing the ability to perceive and react to different pH levels is crucial for soil health, impacting even large-scale industries like greenhouses and agriculture.</p>
21A	AUSCI115	Makena Hales, Annick Berg, Rebecca Brige	Light exposure on mealworms	<p>Exploring the effects of exposing mealworms to light for different amounts of time. The sample size will be 4 mealworms and proper animal care will be used. We will be exploring and recording the CO₂ production and movement that is determined by the light exposure. The procedure consists of three levels of stimulus (no light exposure, one min, two min, three min). There will be an acclimation period of 3 minutes for the mealworms to adjust. The mealworm movements will be observed and recorded. After they are exposed to light, the CO₂ sensor will be used to record the production levels.</p>
21B	AUSCI115	Joel Runnalls, Iandon Dufault,	How does light pollution affect pill bug activity?	<p>How does light affect the CO₂ released from pill bugs? Pill bugs are nocturnal bugs that like dark and damp spaces. We hypothesize that the pill bugs will release more CO₂ when</p>

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		Andrew Thomas, Chelsea Wolosiewicz		exposed to darkness. Because they are nocturnal bugs, they are more likely to be less stressed and move around more. The experimental setup is to have the pill bugs in a Petri dish and have a light sensor in a box with the pill bugs. Then have a lamp on top of the box. We then let the pill bugs sit for a 10-minute acclimation period and then exposed them to light for 3 minutes to see how much CO2 they release. We'll do this for 8 different pill bugs and test them each at different light intensities to see which one produces the most CO2 per gram. The pill bugs will be in a container where we can measure the amount of CO2 they release. There will also be a thermometer in the box with the pill bugs to make sure that the lamp isn't changing the temperature so that temperature isn't a variable in our experiment.
22B	AUSCI115	Katie Bergen, Hollie Ostrowski, Teegan Mergle	The prime pH for pillbugs	Habitat selection provides a unique window into the biology and lifestyle of nonhuman organisms. Our experimental study focuses on the role of substrate pH on habitat selection by <i>Armadillidium vulgare</i> (pillbugs). We hypothesize that, as decomposing matter acidifies its surrounding environment, <i>A. vulgare</i> will prefer slightly acidic environments as they feed on this decomposing matter. The central question we are trying to answer is if the pH of an environment will alter how long an <i>A. vulgare</i> will stay in that environment. Our experiment will force an <i>A. vulgare</i> to choose its preferred habitat out of an acidic, basic, or neutral sample. An equal volume of either an acidic, basic or neutral solution was thoroughly mixed into soil samples. Two equal masses of soil were then placed into petri dishes in the order that follows; acidic-neutral, basic-neutral and acidic-basic, with a hard divider to keep the samples split from each other. Petri dishes were also filled with a double sample of each soil type. The pillbug was then placed on the hard divide, left to acclimate for 30 seconds, then the resulting data was collected based on which side the pillbug was on every 30 seconds for 3 minutes. This method of data collection was repeated for 5 pillbugs across all 6 petri dishes.

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1A	AUIDS301	Alexa Bodner, Rowan Corry, Hanna Orge, Tori Van Bavel, Jordan Zimmerman	Project Tight Knit
1B	AUIDS301	Alexandra Asuncion, Wetsat Bako, Gavin Hu, Olya Klepacheva, Meadow Munroe	Public and Active Transportation in Camrose
2A	AUIDS301	Brittany Determan, Wenwen Lu, Kisum Lyu, Sarah Singular, Brooklyn Swain	Get Gardening
2B	AUIDS301	Brittany Holowachuk, Daniel Moody, Delaney Stelmaschuk, Cassidy Ottenbreit, Marc Parma	Greenspaces: the Key to Making Cities Happy, Healthy and Sustainable

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3A	AUIDS301	Claire Bevan-Stewart, Caitlin Jordan, Pia Vij, Hope Zimmerman, Josie Zimmerman	Let's Look at Local!
3B	AUIDS301	Daniel Ajayi, Brooklynn Bouillon, Aleya Lotzien, Iryna Netesina, Selah Ryan	Camrose Recycling
4A	AUIDS301	Destiny Hobbs-Stewart, Adrian Lam, Anurika Onyenso, Meghna Upadhyay, Lisa van der Woude	Why Improvement of Wastewater is Essential for Sustainability in Camrose
4B	AUIDS301	Frank Dion, Karylle Mata, Kiera Machin, Angelina Lau, Parmida Beedle	Repairing Water Quality in Riparian Areas
5A	AUIDS301	Janiel Dillon, Shaelynn Graumann, Macy McDonald, Tessa Reed, Keira Slusarczyk	Meal planning- A simple sustainable practice
5B	AUIDS301	Kyle Cote, Gervi Dorado, Berenda Helmus, Aman Leung, August Ross	Rain Water Collection Initiatives
6A	AUIDS301	Lexi Brantner, Adachukwu Chimaobi, Brayden Dickau, and Jacob Christensen	The Future of Solar Energy
6B	AUIDS301	Priscilla Adebajani, Anjola Aina, Aarushi Gupta, Arpandeep Kaur, Nicole Roy,	A Deep Dive into Opportunities for Sustainability at Camrose High Schools
7A	AUIDS301	Sydney Abel, Luke Beattie, Cailyn Katchur, Isabel Levesque, Hannah Resch	Ecoscaping for everyone: building a sustainable yard
7B	AUIDS301	Yousif Ismail, Morgan King, Brooklyn Saretsky, Fallon Shelton, Alix Stannard	Camrose Composting
8A	AUIDS401	Rida Ahmed, Sheyne Baker, Natalia Friesen, Jessica Leeson	Tile Together
8B	AUIDS401	Airk Masse, Adrian Caceres, Tadgh Dalton, Chase Opsal	Camrose Pen Pals
9A	AUIDS401	Alex Popiel, Anna Renner, Carly Rombs, Danielle Strayer	Camrose Community Chase
9B	AUIDS401	Beau Alstott, Taylor Olson, Jonas Riel-Longworth, Ryan Symington	Camrose Community Connections
10A	AUIDS401	Gift Akinloye, Lauren Cardinal, Logan Oslund, Cale Scotton	Camrose Community Mentorship Program
10B	AUIDS401	Aashna Mann, Tristen Mckenzie, Fatima Navarro, Yixiao Zhang	Fostering community and socialization through film
11A	AUBIO 419	Madison McNalley	The Effect of Radio Broadcasting on Normalizing Weather Variation Due to Climate Change
11B	AUBIO 419 OUR	Emily Mahon	Play Clean Grow: Tracking Seed Species within Elk Island National Park
12A	AUBIO/ENV 459	Jacqueline Kublik, Amelia Murray, Madi Robinson, Lucille Wang	Cooling Off: How Shade is Influencing Olive Ridley Sea Turtles

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12B	AUBIO/ENV 459	Dana Eliuk, Ben Nawrot, Sami Siegle, Breanna Storch	Canopy Cover Surrounding Mature Ajo Trees and its Influence on Understory Vegetation
13B	AUBIO/ENV 459	Lili Axten, Jenna Miller, Sam Nawrot, Jinxuan Cui	Early Bird Gets the Worm: Species Richness of Costa Rican Birds is Highest in the Morning
13A	AUMAT328	Hrittijia Bhattacharjee, Michelle Duarte Cuartas, Karylle Mata	Security in Random Number Generators Design
14A	AUMAT328	Sandile Ngwenya, Priscilla Adebajji	The Role of Cryptography In Cryptocurrency
14B	AUMAT328	Jacob Baxter, Willis Kneeland, Warren Peters	A Faster and More Realistic "flush+reload" Attack on AES
15B	AUMAT328	Daniel Kirivita, Daniel Krivchun, Logan Oslund	Smart Card Hacking
15A	AUSCI115	Ajwa Niaz, Haedyn Castle, Audrey Boucher, Brianna Winiandy-Munch	The Effect of Soil pH on Redworms
16A	AUSCI115	Masud Said, Mmesomachukwu Nnadi, Zhijian Wang	The impact of temperature on both the physical and psychological behavior of pillbug
16B	AUSCI115	Caelum Hartman, Treston Moisey, Mary Pelletier, Jeremy Wiebe	Effects of Moisture on Mealworm Phenotypic Traits
17A	AUSCI115	Boris Kuljanin, Bryce Boan, Jorden Wiebe, Alix Stannard	The Effect of Light on CO ₂ Production in Pill Bugs
17B	AUSCI115	Katelynn Baska, Adam Duchscherer, Amber Hutton, Chad Nichol	Metabolic Rate and the Influence of Soil Moisture on the Survival of <i>Armadillidium vulgare</i>
18A	AUSCI115	Bela Benjamin, Stephanie Ejezie, Grayson Kuhne, Chigozie Orakwe	Exploring the Relationship Between Light Intensity Levels and Mealworm behavior
18B	AUSCI115	Isaac Boddy, Siddharth Kumaria, Victoria Nwachukwu	Maze Completion of Hot and Cold Pillbugs
19A	AUSCI115	Chance Foster, Korbin Hafso, Aidan Peake, Amy Singh	Effect of Soil pH on Red Worm (<i>Eisenia fetida</i>) CO ₂ production and behaviour
19B	AUSCI115	Emmanuel Okusanya, Alexander Propst Corrales, Amelia Williams	Alternative Waste Disposal of Canola Mash Utilizing Red Worms and Mealworms
20A	AUSCI115	Danielle Michiels, Dominika Nawrocki, Linnea Solowan	Food Motivated Behavioral Pattern of Pill Bugs Investigated Through a T-shaped Maze
20B	AUSCI115	Katalin Hemperger, Aiden Krebs-Elaschuk, Flora Nguyen, Taylor Roberts	Behaviours of Red Worms (<i>Eisenia fetida</i>) Towards Differing Soil pH.
21A	AUSCI115	Makena Hales, Annick Berg, Rebecca Brige	Light Exposure on Mealworms
21B	AUSCI115	Joel Runnalls, Iandon Dufault, Andrew Thomas, Chelsea Wolosiewicz	How Does Light Pollution Affect Pill Bug Activity?

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22B	AUSCI115	Katie Bergen, Hollie Ostrowski, Teegan Mergle	The Prime pH for Pillbugs