

Spring 2019 Student Sustainability Grant

Total Funds Requested: \$85,848.00

Total Funds Allocated: \$68,553.94

1. Bird-Friendly Window Design

Principal Investigators: Mary Clare Griffith & Jonathon Eiseman

Faculty/Staff Advisor: Denise Keele

Abstract: Up to one billion birds are killed by window collisions in the United States annually. Based on preliminary research, certain locations on WMU's campus are known to result in collisions and avian mortality. WMU has a commitment to minimize environmental impact, and building collisions resulting in bird deaths are not consistent with sustainability goals. Bird-window collisions are preventable, as low-cost materials and solutions are available for implementation, to mitigate existing buildings. This project seeks to implement bird-friendly modifications on existing windows at two walkway/Bridgeway locations on WMU campus: 1) Haenicke-Wood Hall and 2) Wood Hall-Chemistry. These modifications would decrease avian mortality, provide opportunity for post-installation monitoring, and serve as demonstration areas to educate our campus community to hopefully inspire future planning and further application of bird-friendly design standards at WMU. Two materials (bird tape and window film) will be applied (one at each location) in order to demonstrate potential options and

gain experience to better inform potential future product choices.

Amount Requested: \$35,400 Amount Allocated: \$16,100

2. Sunbolt Campus XL Solar Work Station: Advancing and Studying Sustainability on Campus.

Principal Investigator: Sage Campbell & Chantel Oah
Faculty/Staff Advisor: Dr. Heather McGee

Abstract: This study will investigate the effects of graphic prompts with integrated quick response (QR) codes posted to a solar charging bench. The hypothesis is that posted prompts and the bench itself will increase website traffic and visibility of sustainable actions at Western Michigan University. Website traffic will be monitored using Google Analytics software which will allow for tracking of website visits specifically from scanning the QR code. Thus, data from bench installation and from bench installation with prompts will be compared with baseline data from before installation graphic prompts. Data that supports the hypothesis, increased website traffic, will lend additional backing to other research on the use of graphic prompts and QR codes to increase behavior and interaction with online entities as well as usage of the solar charging bench by participants. Future research with collections of participant demographics could be conducted in order to analyze which groups out of a more general population may be influenced more by prompts, QR codes, and usage of the bench. This has large implications relating to the advancement of sustainability at Western Michigan University and the increased visibility of sustainable actions being taken by the university.

Amount Requested: \$19,015 Amount Allocated: \$19,015

3. Sustainable Mowing

Principal Investigators: Rhonda Cosby & Noah Boot
Faculty/Staff Advisor: Darrell Junkins

Abstract: People primarily see automobiles as the major culprit of global warming, which is mostly the case. While true, hardly anyone ever stops to look at the lawn care industry. While the automotive industry is highly regulated to reduce carbon emissions in all the vehicles they produce, the use of lawn maintenance equipment production faces no such regulations. On average, Facilities Management runs six mowers, just as many blowers and string trimmers, using on average 28 gallons of gas a day, 12 gallons being diesel fuel. I did the math and calculated that just by maintaining the height of our lawn we create roughly 1,800 pounds of carbon a day just with the mowers. Thanks to the investment of Landscape Services in a Greenworks trimmer and blower, we have found a much more ecofriendly way to maintain grass. The tools have rechargeable batteries which are now going on their third year of use, with no maintenance in this time. They emit no carbon, and many people have commented on how quiet the equipment runs. With one of the Greenworks lawn mowers we can lower the anthropogenic noise pollution and reduce the carbon dioxide emissions considerably. This would also make a study of the cost effectiveness of battery powered equipment. It is my hope that I can make Western Michigan University and Facilities Management realize that the mowers will not only pay for themselves with no fuel costs, but we can also make our university more ecofriendly.

Amount Requested: \$22,499 Amount Allocated: \$22,499

4. Trees on East Campus

Principal Investigator: Brandilyn Wilson

Faculty/Staff Advisor: Brian Gogan

Abstract: I am requesting a \$1,100 grant from the Office for Sustainability at Western Michigan University to plant six trees between parking lots 10 and 95 on East Campus. In doing so, we will alleviate two sustainability issues- one environmental and one cultural.

Amount requested: \$1,100

Amount Allocated: \$1,100

5. Experimental Verification of Theoretical model for Thermoelectric Generators Using Ethylene Glycol

Principal Investigator: Sudarshan S. Rawale

Faculty/Staff: Dr. Hosung Lee

Abstract: Using Thermoelectric Generators (TEGs) to convert waste heat (even low-grade heat) into electric energy has been considered as sustainable and low-cost energy sources. The prime objective of this research is to experimentally validate the theoretical design of thermoelectric devices that takes advantage of heat wasted through a working fluid to generate power that can be utilized for various applications in a restricted/remote environment. This research also aims to study, understand and demonstrate the effect of change in the properties of the working fluids such as temperature difference between two working fluids, mass flow rate, etc. and with different number of combinations of TEG modules. The low-grade waste heat can be considered anything approximately between 30-150 degrees Celsius. This study aims to demonstrate that optimized TEG potential, in terms

of output and efficiency, to compete with other mechanisms or devices that harvest low-grade waste heat energy, while still having an advantage of no maintenance and environmental costs of thermodynamic devices. A laboratory test setup consisting of a two-channel loop heat exchanger is used for the study. A mixture of 50% ethylene glycol with water flows through two separate loops, one hot side loop and one cold side loop to create a temperature gradient between both the sides of the Thermoelectric Generators. Further study may be studying the factors affecting the output power and the efficiency of the Thermoelectric devices and trying to take it to the optimum level.

Amount Requested: \$1,480

Amount Allocated: \$0

6. Greek Guide

Principal Investigator: Allison Mauriello & Katie Rourke

Faculty/Staff Advisor: Cameron Smith

Abstract: The College Panhellenic Council at Western Michigan University is seeking a grant to purchase an app that will eliminate the need of printing more than 2,750 color ink papers. In addition, the College Panhellenic Council is also seeking the grant to finance 250 reusable water bottles for potential new members to refill and use throughout the entire fall recruitment week.

Amount Requested: \$2,155

Amount Allocated: \$0

7. The Living Woodshop Courses

Principal Investigator: Andrew McCabe

Faculty/Staff Advisor: Joshua Shultz

Abstract: In an increasingly manufactured world, it is difficult to understand which goods presented to us are designed and built in

environmentally conscious ways. WMU has resources for sourcing locally grown food, creating vegan meals, sustainable transport either on bike or on bus, and sustainable work. This does not hold true for sourcing and making the items around us such as office, kitchen, or home goods. It is in the design, manufacture, or purchasing processes that we lack a way to demonstrate to the student body and local community how to identify or make every day goods sustainability. The wood shop at the Office for Sustainability offers itself as this resource to Wesustain Interns as well as community members in the form of workshops and green woodworking classes. These classes are open to anyone and offer a way to learn from the experience of woodworking. Currently only spoon-making courses can be taught to students due to the limited number of tools. In applying for this grant the wood shop is seeking funding to be able to offer two additional classes. One course will be in the construction of lathe items such as rolling pins or bowls and the other will be for home repair. Both classes will continue in the tradition of using solely human-powered tools as well as prompting diversity of individuals and prior skill-sets.

Amount Requested: \$1,499

Amount Allocated: \$488.94

8. Covered Bike Shelter

Principal Investigators: Tanai Dawson & Ben Pikaart

Faculty/Staff Advisor: Cybell Shattuck

Abstract: Western's large campus offers a large variety of resources that can't be easily found on other campuses. One such resource is the Office for Sustainability. The student funded resource has done many great things to aid the campus and its students on a more sustainable path to positively impact our environment in the future. The Covered Bike Shelter proposal aims to create a social impact on students' environmental behavior and responsibility to aid the Office for Sustainability in

pursuit of a sustainable campus. With multiple bike shelters built on campus, a more sustainable campus can be acquired.

Amount Requested: \$27,000. Amount Allocated: \$9,351

Fall 2018 Student Sustainability Grant

Total Funds Requested: \$35,642.37

Total Funds Allocated: \$31,457.62

1. Sustaining Natural Ecosystems: A WMU Service-Learning Project Abroad

Principal Investigators: Marshall Kim & Maria Carson

Faculty/Staff Advisor: Dr. Lee Penyak

Abstract: Bill Mollison coined the term permaculture, a system of agricultural and social design principles centered around simulating or directly utilizing the patterns and features observed in natural ecosystems. Proponents believe sustainability projects must take social and cultural factors into account. Dr. Jennifer Harrison, WMU assistant professor of social work, will take students to Guatemala during spring break 2019 as part of her IPE 3050/6050 study abroad program (Community Health and Permaculture), which explores the interplay among permaculture, sustainability, and healthcare. Harrison has forged close ties with “Mesoamerican Permaculture Institute” (IMAP) and “Mayan Families” (FM). IMAP works with local communities to develop the skills and awareness needed to “ensure food sovereignty... and the preservation of biodiversity and ancestral knowledge.” FM facilitates enduring sustainable programs that promote community development. We seek a sustainability grant in the amount of \$4,866 to subsidize WMU student expenses to

promote sustainability efforts in Guatemalan indigenous communities. \$3,896 covers IMAP expenses to make lasagna composting, install an ancient herb garden in a displaced community, purchase/conservate native seeds well-adapted to the local environment, buy and install drinking water filters, and prepare a meal for an impoverished community using local foodstuff. \$970 covers FM expenses for four Olin stoves. The final team will consist of twelve students and two faculty members. A \$4,866 sustainability grant would reduce the total student program fee from \$1,950 to \$1,602 ($\$4,866/14=\348).

Amount Requested: \$4,866 Amount Allocated: \$ 1,750

2. Solar Cells and Batteries for Sunseeker

Principal Investigator: Kyle Lyman & Andrew McCabe

Faculty/Staff Advisor: Mitchell Keil

Abstract: Since 1990, Western Michigan University's solar car team, known as Sunseeker, has been designing and racing solar powered vehicles. Not only does the Sunseeker team design the car, but it also constructs most components of the car. This includes the encapsulation of solar cells. Western Michigan University is one of the few schools in the nation that produces its own solar panels. We are requesting solar cells, as well as batteries, vacuum bagging material, and tab connectors to experiment with our solar cell encapsulation process, as we seek to create more efficient panels.

Amount Requested: \$7,999.27 Amount Allocated: \$7,999.27

3. Vermicomposting on Campus

Principal Investigator: Zach Olson

Faculty/Staff Advisor: Justin Gish

Abstract: This grant proposal of \$500, if approved, will be used for a vermicomposting system that will be constructed at the Office for Sustainability, on the outside of the building nearest to the Western View apartments. This system will mimic what already exists in the hoop house at the John Gibbs house. Dimensions and materials will be very similar if not identical. The point of implementing this system on campus is so that we can help further divert waste in a more convenient way for campus buildings and offices. This will be a pilot program that acts as a model to the rest of campus in hopes of convincing other campus buildings and residential halls that through our experience, vermicomposting is a highly efficient and beneficial way to divert food waste, ultimately making its way back to soils which then provides rich material for healthy plants to grow without the use of synthetic fertilizers and inputs which delocalize our food resources. There has been comprehensive research done on this topic, which provides overwhelming evidence supporting vermicomposting's many benefits. If approved for this grant proposal, I aim to help educate people on this topic and encourage students, faculty, and other campus buildings to incorporate a vermicomposting system on their property which I hope will lead to less waste funneled into landfills and back into the soils of our community.

Amount Requested: \$500 Amount Allocated: \$0

4. Engineers without Borders (EWB) Spring 2018 Student Sustainability Grant Principal Investigator: Saleh Mohamed & Stephen Siitari Faculty/Staff Advisor: Dr. Pnina Ari-Gur

Abstract: Engineers Without Borders (EWB) is an internationally recognized non-government organization that

strives to bring sustainable, community led engineering solutions to the developing world with the purpose of helping communities meet their basic human needs. Western Michigan University has the prestigious status of being able to host one of the chapters in the southwestern Michigan area. This chapter was established by a group of students who wanted to implement sustainable engineering techniques to make an impact to local and international communities. A huge number of students have joined the chapter since its founding, which is a testament to how strong the spirit of sustainability is on campus. In a little over two years, we have gone from just a handful of students to a thriving chapter with a strong presence locally, nationally, and internationally. Our chapter has been given an opportunity to pursue a project for the San Antonio De Upa community in Nicaragua. Thanks to the Office for Sustainability grant last year we were able to cover part of our expenses for the assessment trip. Our goal is that we would like to implement the project this year. We have also completed a project locally with the Gibbs house to build sustainable solar food dehydrators and will soon be working with a local school to build a greenhouse. Our chapter has worked for years to help Western Michigan University become recognized both locally and internationally as a pillar of sustainable engineering, and as such we hope that the Office for Sustainability will consider supporting our efforts once again.

Amount Requested: \$4,972 Amount Allocated: \$4,972

5. Leaders Unplugged Equipment

Principal Investigator: Margaret Scannell & Ariel Butler

Faculty/Staff Advisor: Kate Bates

Abstract: Time spent observing the natural world around you, disconnecting from the technological age, and being reminded of

human's true place as a part of nature all while learning new skills. This is what Leaders Unplugged offers students at WMU. Provided every fall and early summer, Leaders Unplugged is a backpacking trip offered through the Office of Student Engagement. For many students this may be their first immersive experience in nature and our office is proud to make this wilderness experience accessible to students who otherwise may not know how to have such an experience. With the help of the Student Sustainability Grant our office will be able to provide some of the most important pieces of equipment (tents and sleeping bags) for a trip like this to students who might not be able to afford their own, or simply might be unsure if backpacking is something they would like to continue in the future.

Amount Requested: \$8,300 Amount Allocated: \$8,300

6. Growing for Good

Principal Investigator: Kyle Knaub & Taylor Berry
Faculty/Staff Advisor: Anthony Helms

Abstract: This proposal will advance sustainability at WMU by giving students an opportunity to learn about their ecological footprint and allow students to see the impact of composting. If granted the funds, this composting area will also serve to be a community garden for students to take care of and learn how to grow their own crops. Students will also see how their work can benefit their peers and the community by growing their own food. We are hoping that there will eventually be more interest in the composting bins and other departments on campus will want to contribute materials which will allow us to produce more crops to give to students.

Amount Requested: \$4,605.10 Amount Allocated: \$ 4,036.35

7. Alternative Energy Power Bank

Principal Investigator: Jared Wendland & Aaron Herbert
Faculty/Staff Advisor: Peter Gustafson

Abstract: The objective of this research proposal is to design a battery power bank aimed at working with alternative and grid energy sources. A goal of our project is to meet the rising energy demand and accelerate the changes we see happening in our WMU community toward renewable energy. Our plan is to introduce our system into active displays in labs and potential full integration in facilities such as the Gibbs House. We want our system to bring the vast idea of green energy to a tangible, easy to understand device. This energy storage system will demonstrate the simplicity of renewable energy systems. Our project will investigate ways of improving efficiencies and reducing costs of power bank systems. With our device we want to foster a great understanding for renewables and develop of consciousness of energy consumption on campus.

Amount Requested: \$4,400 Amount Allocated: \$ 4,400

Spring 2018 Student Sustainability Grant

Total Funds Requested: \$53,096.16

Total Funds Allocated: \$43,111.43

1. Sustainable Aircraft Research to Enable Implementation

Principal Investigators: Cameron Segard & Heather Irish
Faculty/Staff Advisor: Dr. Ro

Abstract: The objective of this research proposal is to expand upon our research flight test simulator to study the potential of

alternative energy source propulsion systems and modern aircraft configurations. Our goal is to educate Western's student body to be aware of and understand the benefit of these new aircraft designs. Western's student body will act as a ripple in the pond spreading accurate facts about the next generation of aircraft to be debuted enabling more positive conversations about new aircraft designs and fuel sources, thus allowing for more environmentally friendly designs and fuel sources to reach market.

Amount Requested: \$15,202 Amount Allocated: \$15,202

2. WMU Makerspace PLA Recycler

Principal Investigators: Daniel Mozel & Jill Puckett
Faculty/Staff Advisor: Tyler Payne

Abstract: The WMU Makerspace is currently one of the few places on campus that students readily have access to rapid prototyping materials and tools, including 3D printing services. 3D printing allows students to create low resolution models during the design process, keeping costs low and allowing for a better output faster during the design process, keeping costs low and allowing for a better output faster during the design process. While this service is an incredible asset to students, it is not always environmentally friendly with many failed prints and wasted polylactic acid plastic (PLA) from support material and scraps.

In order to address this problem, we would like to propose the purchase and use of a PLA recycler in the Makerspace. This machine will allow students in the Makerspace to recycle and reuse failed prints and scraps, leading to a more sustainable 3D printing system at WMU. While we would still be using plastic, we would no longer need to throw away scraps and failed prints, helping keep plastic out of landfills and oceans.

Amount Requested: \$4,934 Amount Allocated: \$4,934

3. **Adding Waste Powder Paint to Cement Mixers**

Principal Investigators: Dustin Black & Sean Harrigan

Faculty/Staff Advisor: Dr. Upul Attanayake

Abstract: Powder paint is used in automotive and furniture manufacturing. Approximately 1.5 million pounds of waste powder paint (WPP) produced in West Michigan is discarded into landfills every year. Instead, WPP can be used as a supplementary cementitious material (SCM) in the concrete and masonry industry. SCMs are local manufacturing by-products that are incorporated into concrete mixtures to modify the physical properties of the mixture and to introduce the element of sustainable manufacturing. WPP can be used as a cement replacement or property modifier. The properties that are improved are strength and durability – the two most important factors in sustainable concrete engineering.

Chi Epsilon is requesting funding to purchase the necessary laboratory equipment to perform a series of tests per the industry-standard guidelines set forth by the American Society for Testing and Materials.

Amount Requested: \$6,830 Amount Allocated: \$6,830

4. **Food Service Operations & Sustainability Compost**

Principal Investigators: Sarah Lewis

Faculty/Staff Advisor: Robert Adam Manley

Abstract: Students of the Food Service Operations and Sustainability Program are in need of a method to further research and practice sustainable methods of food waste disposal in their classroom environment. The purpose of this

proposal is to build a composting area for the culinary classrooms of this program to sustainability dispose of their food waste and provide composted soil for use at university facilities. Students of Family and Consumer Sciences will construct the compost box.

Amount Requested: \$1,150 Amount Allocated: \$0

5. Alternative Energy Utility Vehicle (AEUV)

Principal Investigators: Zackary Meisner & Andrew Tuinenga
Faculty/Staff Advisor: Dr. Jorge Rodriguez

Abstract: We are proposing the design, fabrication, and benchmarking of a utility vehicle that can make use of those cutting edge technologies. The utility vehicle will use alternative energies to power the electric drivetrain with the capability of solar charging as well as standard plug-in charging. The vehicle will be created with three goals in mind: i) efficient performance in all terrain types, ii) To serve as a showcase for the college to raise awareness for alternative energies, inspire future engineers and display how alternative energy can be useful and fun, and iii) to benchmark in comparison to an on-campus utility vehicle for possible adaptation.

Amount Requested: \$4,999 Amount Allocated: \$0

6. Fuel Cell Stack and Catalyst Purchase

Principal Investigators: Sudharsan Sridhar & Suraj Sundaram
Faculty/Staff Advisor: Dr. Muralidhar Ghantsala

Abstract: The purpose of the research is to increase the efficiency and lower the cost of commercially available fuel cells, with the replacement of platinum material. Our plan is to design and manufacture a new electrode-catalyst material that can

replace the currently available Pt/C catalysts, which makes it economically feasible to everyone.

Amount Requested: \$9,953 Amount Allocated: \$9,953

7. Leaders Unplugged

Principal Investigators: Nicholas Talamentez & Victoria Morse
Faculty/Staff Advisor: Kate Bate

Abstract: This proposal asks for funding to purchase backpacks for students to use on a biannual educational backpacking trip. This trip will teach students Leave No Trace principles and encourage a greater appreciation of the natural world. Through funding backpacks the SSG would make this trip more accessible to students who are not in the economic situation to fund packs themselves. It will allow students who are otherwise could not have such an immersive experience in nature the opportunity to do so. The goal for students is to come back to campus ready to lead as “sustainability ambassadors” based on their experiences.

Amount Requested: \$4,800 Amount Allocated: \$4,800

8. Exhaust Waste Heat Recovery by Thermoelectric Generators

Principal Investigators: Matthew Habel and Matthew Frank
Faculty/Staff Advisor: HoSung Lee

Abstract: The goal of this project is to design and test a thermoelectric generator system to reclaim the waste exhaust heat energy created by a gasoline engine. Energy recovered can then be used in other functions and operations of the car. This concept that energy, which would have been wasted, is being recovered into usable energy, and is therefore increasing the

efficiency of the engine. Leading to a reduction of the amount of fuel that is required to operate the vehicle. This thermoelectric generator array will be used in tandem to an optimized set of heat exchanger fin systems. The thermoelectric system will provide data for further research into this technology providing a more sustainable future in the automotive industry.

Amount Requested: \$1,380 Amount Allocated: \$0

9. Engineers without Border Sustainable Water Project

Principal Investigators: Magreth Haji & Alexis Blakley
Faculty/Staff Advisor: Dr. Pnina Ari-Gur

Abstract: We are applying for this funding to help our chapter implement the project which consists of building the community a water system. These funds would help with the travelling expenses as well as the equipment needed for the project. We are going to establish a water purification and transportation system. This project will directly affect 305 people in the community as well as potential members of the community in generations to come hence the number of lives the project is going to impact is likely to increase over the years.

Amount Requested: \$4,998.16 Amount Allocated: \$300

Fall 2017 Student Sustainability Grant

Total Funds Requested: \$34,546

Total Funds Allocated: \$16,584

1. Engineers without Border Sustainable Water Project

Principal Investigators: Jessica Graves & Turner Slaughter

Faculty/Staff Advisor: Dr. Prina Ari-Gur

Abstract: Engineers Without Borders (EWB) is an internationally recognized NGO that strives to bring sustainable, community-led engineering solutions to the developing world in order to help community meet their basic human needs. Our chapter has been selected to establish a water purification and transportation system in San Antonia de Upa, Nicaragua. This project will directly impact the lives of 305 people and indirectly impact the lives of another 132 people based on data given to us by the community. This project also has the potential to impact the lives of community members for generations yet to come, so the true number of lives this project will impact is likely to be much larger.

Amount Requested: \$7,568. Amount Allocated: \$628

2. Solid State Lighting Conversion

Principal Investigators: Albert Wright & Jumana Turkistani
Faculty/Staff Advisor: Dr. Steve Durbin

Abstract: This project we want to prove the advantages of using LED over CFL bulbs regarding cost and functionality. Our senior design project is solid state light conversion. Lights in the classrooms are difficult to dim due to the large intervals between brightness output levels. In addition to the light dimming issues, lights flicker spontaneously and repeatedly throughout a 50-minute lecture session. This project will improve the dimming capabilities by replacing the outdated technology.

Amount Requested: \$200 Amount Allocated: \$200

3. Take the Stairs

Principal Investigators: Logan Ryzenga & Riley Todd

Faculty/Staff Advisor: Susan L. Caulfield

Abstract: Taking the elevator uses more electricity than many people may realize. Over 3,000 people attending the College of Health and Human Services, the additional energy savings could be enormous. Using human energy to walk up the stairs is far more sustainable than electricity. By education, thoughtful design, and encouragement we hope to change the elevator culture of the College of Health and Human Services into one that represents health and sustainability. We would like to implement vinyl wraps on the elevator doors. 3M Controltac Graphic Film was previously approved for this purpose at WMU on the Bill Brown elevator.

Amount Requested: \$4,988. Amount Allocated: \$48

4. Locklizard

Principal Investigators: Sandra Graybill & Megan Bogel
Faculty/Staff Advisor: Nicole Allbee

Abstract: The current Hearing Panel process in the Office of Student Conduct (OSC) is unsustainable in terms of paper waste and cost of human time. The following proposal addresses a viable solution to reduce paper waste and increase productivity and the protection of student conduct records. OSC wishes to purchase Locklizard's Safeguard PDF Security, an internationally recognized software, to transform the hearing process into a paperless format. Safeguard PDF Security software will allow the OSC to convert all case documents into secure PDFs, administer privacy protection, and distribution through a web-based link. By utilizing this software, the OSC will significantly decrease paper waste, human costs associated with the current material preparation process, and will exercise greater control over the protection of student records.

Amount Requested: \$9,495 Amount Allocated: \$9,495

5. Costa Rica: The Great Green Experiment

Principal Investigators: Rachel Holbert & Cheruba Daniel

Faculty/Staff Advisor: Lauren Carney

Abstract: The grant would allow Kalamazoo Promise scholarship recipient students and other interested students to study abroad at Earth University in Costa Rica. The students will attend workshops about urban farming, waste management and learn about sustainability in one of the most sustainable campus in the world. Earth campus in Guacimo is in the heart of the tropical rainforest in the Caribbean lowlands of Costa Rica. The 8,342-acre campus includes classrooms, laboratories, academic farms, sports and recreational facilities., student and faculty residences, a commercial banana plantation, reforested areas and a forest reserve. They will share and enjoy cross-cultural experiences with students from approximately 36 different countries. Prior to the trip, students will tour Gibbs House, and learn about the practices in use right here in Kalamazoo.

Amount Requested: \$4,999 Amount Allocated: \$4,999

6. Students for a Sustainable Earth

Principal Investigators: Hailey Olson & Shannon Ervin

Faculty/Staff Advisor: Stephan Keto

Abstract: The funds would be used to purchase tools and seed to help us remove invasive species and plant native species, an RSO we have recently adopted a mentality to become more active within our local community through sustainable initiatives. We believe this to be a great route for our organization. We are also asking for funding to help support our sustainable initiatives on campus with items such as stickers,

reusable bags, and a banner. The last item is decals for the WMU recycling dumpster that, we noticed, are not being used appropriately.

Amount Requested: \$2,877 Amount Allocated: \$1,210

7. Bronco Eco Racing Car

Principal Investigators: Ramin Mirshab & Jonathan Gallee
Faculty/Staff Advisor: Koorosh Naghshineh

Abstract: To build a fuel-efficient race vehicle by researching and using alternative fuels along with the use of 3D printing means that students can create radical designs that integrate curves and geometry that is otherwise impossible using conventional materials such as aluminum. In addition to this the team can use 3D printing to create molds which can later be used to create even lighter components out of advanced materials such as carbon fiber.

Amount Requested: \$4,419 Amount Allocated: \$0

Spring 2017 Student Sustainability Grant

Total Funds Requested: \$21,101

Total Funds Allocated: \$16,420

1. Hydration for Health and the Environment

Principal Investigators: Rojeliio Batas and Austin Seavolt
Faculty/Staff Advisor: Joe VanDerBos

Abstract: Members of the Student Health Advisory Council take as their responsibility advocating for health behavior in all realms of student life. Our efforts extend to supporting environmental concerns where they intersect with the health of the campus community. As frequent visitors and volunteers at WMU's Sindecuse Health Center, we see

students (both prospective and current), faculty and staff use this campus facility and have identified a gap that would easily be filled by the addition of two hydration station on the lower and upper levels of the building. Our proposal asks that funding be granted to install these hands-free, filtered hydration stations as a way to improve environmental AND health impacts. The hands-free operation supports best practices in medical care in a building which welcomes many visitors and encourages proper hygiene practices. By encouraging hydration in areas with physical rehabilitation exercises, we support improving the health and wellness of patients.

Researchers have identified that these stations have climate change impacts “two to six times lower than those of bottled water” (Makov, et. Al., 2016). The success of existing hydration stations at WMU can be extended to more areas, and likely increase the environmental impact of existing stations. Having more stations readily available is likely to encourage behavior toward refilling bottles rather than buying new plastic bottles.

Amount Requested: \$5,120 Amount Allocated: \$5,120

2. Sunseeker Solar Cells and Trailer Purchase

Principal Investigators: Bo Ching Wong and Krystal York
Faculty/Staff Advisor: Bradley Bazuin

Abstract: The Sunseeker Solar Car team at Western Michigan University is looking for ways to further improve the efficiency of their next generation solar vehicle. The project aims to accomplish that goal through the design and build of a next generation solar vehicle. We have participated in all of the American Solar Challenge races since they began over 27 years ago. Throughout the years, we have raced with various cars, all of which have been designed and built by students at Western Michigan University.

The Sunseeker car hauler has been services out team for almost three decades. The wooden part of trailer is going to deform, there are

numerous holes on the roof. The water leakage in the rain would probably damage the electrical system of the car. The situation almost happened in the heavy rain during the American Solar Challenges last summer. This seriously hinders the ability of our team to outreach and get to more events and provide sustainability education for more groups. Therefore, Sunseeker is going to purchase a new enclosed trailer for racing and long trips.

This year, we are traveling to Circuits of Americas in Austin Texas for Formula Sun Grand Prix (FSGP) 2017 from July 2 to 9. We would take this opportunity to promote solar vehicles and compete for our school.

The regulation in ASC/FSGP 2018 has limited the maximum solar array area in 2 square meter. This means our previous solar cars having 6 square meters would not be eligible to compete in the competition. Therefore, new solar cells are required for new solar array for new solar vehicle.

Therefore, we are applying for the Student Sustainability Grant to pay off the cost of a new car hauler. We planned to purchase the car hauler as late as the first week of May. The solar panel purchase would be done after FSGP 2017 in July so that we can collect data and recommendation from other teams to purchase the ideal and suitable solar cells.

Amount Requested: \$9,500 Amount Allocated: \$9,500

3. Hydration Station for Trimpe

Principal Investigators: Bradley Rangel & Siobhan Williams
Faculty/Staff Advisor: Tiffany White

Abstract: It takes approximately 1000 years for a plastic water bottle to biodegrade, and it is estimated that four of five plastic bottles end up as litter, contributing to the estimated five trillion articles of plastic in our oceans today. In an effort to counteract this issue, many buildings around campus are including new hydration stations to encourage the

use of reusable water bottles and to cut down on the excessive use and waste of plastic water bottles. The Trimpe Building, which sees a growing amount of foot traffic due to the numerous offices, programs, and events that take place regularly within it, would benefit considerably from the addition of a hydration station. The offices located in the Trimpe building include the Office of Diversity and Inclusion, the Office of Institutional Equity, the office of Lesbian, Bisexual, Gay, and Transgender Student Services, and the Kalamazoo Promise Scholars Office. Trimpe also houses multiple events year-round, a reflection room, and the “inclusive, equal access resource room and lounge” also known as “Our Space.” The many offices of the Trimpe building support and work to uphold Western’s sustainability platform and initiative to reduce its ecological footprint. To reduce the need for plastic water bottles, three offices in Trimpe have taken to purchasing water jugs from Gordon’s Water on a regular basis, but having a working filtered water bottle filling station would be a more cost-effective alternative.

Amount Requested: \$1,800. Amount Allocated: \$1,800

4. Reducing Contamination

Principal Investigators: Grant Corbat & Riley Thomas
Faculty/Staff Advisor: Heather McGee

Abstract: Setting up a booth at Bronco Bash is a great way for the Sustainability Office to reach out to the student body at WMU. This booth can collect emails in exchange for giving student a chance to test their knowledge about sustainability or a reusable tote with the same logo and slogan. Organic T-shirts would cost \$8.00 apiece and totes would cost \$7.95 apiece. For 250 organic cotton shirts and for 200 plastic buttons, it would cost \$4,231.46 or \$4,681.46 depending on where printing will take place. These prizes will offer incentive for students to give their emails and learn more about sustainability.

Emails will be further used to send students more information about sustainable practices they can apply to college life.

Amount Requested: \$4,681 Amount Allocated: \$0

Fall 2016 Student Sustainability Grant Proposals

Total Funds Requested: \$10,133

Total Funds Allocated: \$5,815

1. Alternative Transportation: Hydraulic Electronic Bike

Principal Investigators: Luis Morales and Andrew Klug

Faculty/Staff Advisor: Jorge Rodriguez

Abstract: Transportation is a topic of extreme importance in sustainability efforts all over the world. Society has come to depend on transportation in order to have economic and social standards, but its dependence on fossils fuels is the largest negative effect on the environment. Bicycles have been a very popular means of transportation all over the world, with one of its constraints being the distances that it can be travelled because it is usually based on human power. One alternative to the human-powered bike is an electronically-controlled hydraulic bike, which applies the advantages of hydraulic systems for its operation.

One of the main advantages of hydraulic systems is their high power density, which means that there is a power advantage, and with a small input it can produce a multiplying effect, thus allowing a more efficient use of the energy placed into the system. Such benefit can be utilized in order to have transportation that can be used for longer distances. Similarly, the use of a hydraulic system will present the opportunity to think of efficiency and energy storage. The proposal is for the design, fabrication and testing of a hydraulic bike that will serve as: a) human-powered vehicle competitive in a national

competition, and b) demonstration and showcase vehicle during public events at the College of Engineering and Applied Sciences (CEAS). Both goals will serve to increase awareness about sustainability and alternative transportation. Every young person is attracted to hands-on driving and competition, and this unique vehicle will be great educational tools because students will have the opportunity to experiment with them in future projects, and at the same time they will be great engaging devices that will capture young minds and will put that seed about sustainability and alternative transportation in their brains.

Amount Requested: \$3,970 Amount Allocated: \$3,310

2. Permaculture from Mesoamerica to Kalamazoo

Principal Investigators: Brianna Brown and Amber Hojnacki

Faculty/Staff Advisor: Dr. Heather McGee

Abstract: Plentiful food and consumer goods can be easy to take for granted in Kalamazoo, Michigan. To understand the impact of what we grow, eat, and purchase in our own community, and on our neighbors around the world, sometimes you need to leave the area, or even the country.

This grant would allow students and community members to share the knowledge learned during study abroad in Guatemala with their community in Kalamazoo. We hope to get the person who first inspired and taught us all about permaculture and sustainability to come to Kalamazoo as a guest lecturer and for a series of community events in 2017.

Permaculture is a part of life in the Mayan communities in Guatemala. Teaching about permaculture and sustainability structures indigenous communities to support natural ecosystems, even as they are supported by them. The Mesoamerican Permaculture Institute (IMAP)

is a non-profit in Lake Atitlan dedicated to bringing permaculture, indigenous growing principles, and food sovereignty to the region, and to partners around the world.

Several departments on campus, including the academic departments of Social Work, Business, Anthropology, and Spanish who have all expressed interest in these lectures for their students and courses. We have also contacted the Office for Sustainability, Residence Life, Dining Services and the permaculture garden group. These pieces will give us some more tangible beginnings for what we want to accomplish. With all of these resources we hope to create a very diverse program that will easily available to Western's community in educating towards a more sustainable future.

Amount Requested: \$2,505 Amount Allocated: \$2,505

3. Increasing the Reuse of College School Supplies

Principal Investigators: Gabriel Triveline and Macy Mietrich

Faculty/Staff Advisor: Heather McGee

Abstract: Our program, the Donation Station, will have two main effects campus wide including environmental and financial benefits. Paper can account for as much as 60 percent of school waste in America, and Western Michigan University is no exception to this environmentally detrimental phenomenon. From printed syllabi and exams to half used notebooks and pencils, our campus could improve greatly on paper reuse and reduction. In addition to environmental gains, there is also a potential financial gain for Western Michigan University students with the implementation of this project. According to the College Board, the average yearly cost of books and supplies for an American college student enrolled in an undergraduate program at a four-year public college was \$1,200 in 2016. This figure, combined with rising tuition rates, may lead students to become overwhelmed with

high expenses and growing student debt. Through this program, students could personally save on average about one hundred dollars each academic year. For these reasons, an intervention such as the Donation Station is crucial in taking steps toward bettering our campus, our environment and helping our students. Our goal is to improve collegiate school supply reuse, as well as present our students with an opportunity to improve our environment and decrease student financial costs.

Amount Requested: \$380 Amount Allocated: \$0

4. Decreasing Contamination Through Prompts

Principal Investigators: Grant Corbat

Faculty/Staff Advisor: Heather McGee

Abstract: The current project proposes to set up a booth at Bronco Bash as a way to reach out to the student body at WMU about sustainability. More specifically this project targets reducing littering and increasing appropriate recycling behavior at various sporting events on campus. This booth would allow us to collect emails and give students a chance to test their knowledge about sustainability and win either an organic t-shirt with an amusing logo and slogan about sustainability or a button with the same logo and slogan. the t-shirts will serve two functions 1) to provide students with an incentive for getting involved at the Bronco Bash booth and 2) to act as a prompt at sporting events to target littering and recycling behaviors. Organic t-shirts would cost \$8.39 apiece and buttons would cost \$1.99 apiece. For 250 organic cotton shirts and for 500 buttons, it would cost \$3,278.05 (including tax). These prizes will offer incentive for students to provide us their emails, which would allow us to send them more information about sustainability. Emails can also be further utilized to send students

more information about sustainable practices they can apply to college life.

Amount Requested: \$3,278 Amount Allocated: \$0

Spring 2016 Student Sustainability Grant

Proposals Total Funds Requested: \$30,056.47

Total Funds Allocated: \$18,461.47

1. Hydration Station

Principal Investigators: Jill Puckett and Shannon Bajo

Faculty/Staff Advisor: Dr. Frank Cordero, Food Service Administration

Abstract: It has been found that over 300 million tons of plastic are produced in the world each year. Because so much plastic is produced and then disposed of, scientists have coined the term “plastisphere” in reference to the accumulation of plastic on our planet. Michigan is no exception’ unfortunately our great lakes and bodies of water are infested with plastic, especially from the disposal of water bottles. As students who uphold and support Western Michigan University’s sustainability platform, we propose the installation of a filtered water bottle fill station on the third floor of Kohrman Hall. Kohrman Hall is home to a variety of students from many disciplines, including Fashion Merchandising and Design, Career and Technical Education, English as a Second Language, English and Writing, Engineering, and Aviation. The installation of a filtered water bottle fill station creates many benefits to students and our environment alike. Benefits include the use of less disposable water bottles on campus, fresh and cool water readily available to students and other Western community members that use Kohrman Hall, and the prevention of germs spreading because the station is hands-free. We believe that the installation of such a device

represents Western's commitment to sustainability and can foster more actions toward sustainability in the future.

Amount Requested: \$2,400 Amount Allocated: \$2,400

2. Peace Week: Hullabazoo and Hooping for Self-Care

Principal Investigators: Janet Aladetohun and Elivira Ubaldo Ace Ruiz

Faculty/Staff Advisor: Susan Freeman, Gender and Women Studies

Abstract: Peace Week is an annual weeklong series of social justice oriented events hosted by the Kalamazoo Peace Center. The goal of this series is to get students and community members engaged around issues of social justice in tangible, fun, and accessible ways. We are requesting funds for two specific events during this week, Hooping for Self-Care and Hullabazoo, both events that have successfully taken place on campus in the past. Both of these events reflect the values of the Peace Center, such as accessibility practices that are cost-effective and ethical. Hullabazoo gives students the opportunity to work cooperatively to share skills and resources, build connections with the communities adjacent to campus, and learn practices that are sustainable and shareable with the rest of our campus. Self-care is something we try to educate all of Kalamazoo by providing the opportunity and resources to interact with various self-sustaining- be it mental, emotional, or physical- practices. Hooping is a physical activity done with a hula-hoop that can be physically and mentally grounding while being an aerobic practice. There is a sizeable hooping community in Kalamazoo that is always welcome to sharing and learning with Western's student body. Both of these events during the week also reflect the importance and power of a local economy and keeping money and encouraging students and community members to think outside of the infrastructure we currently exist in, making creative engagement an essential part of activism, resilience and movement building.

Amount Requested: \$3,235 Amount Allocated: \$770

3. Goldsworth Valley Pond:

Principal Investigators: Morgan MacFarlane and Annalisa Wilder
Faculty/Staff Advisor: Lisa Dechano-Cook, Geography

Abstract: Western Michigan University has continued to be a beacon for sustainability, advancing the university in many different fields. While the area around Goldsworth Valley Pond is being remodeled, we see the perfect opportunity to enhance land astatically, and increase sustainability. We want

to work with Landscape Service to plant many new trees! Planting new trees would not only enhance the area, but it would expose students to new types of trees, and produce opportunities for students to plant trees, and learn about the different species and how to take care of them.

Amount Requested: \$13,469.48 Amount Allocated: \$13,469.48

4. T-Shirt Swap

Principal Investigators: Cameron Wolbrink
Faculty/Staff Advisor: Chris Sligh, SALP

Abstract: Starting in the 2009-2010 school year, the Western Student Association developed the t-shirt swap that took apparel form other campuses, such as the University of Michigan, Michigan State University, etc., and traded it for a brand new WMU shirt. We will be doing this event again this year, however we will be doing one thing different from this initial project. We have since learned that t-shirts can be pretty harmful for the environment and that not all students have apparel form other schools to swap. Therefore, the Western Student Association has decided to partner with “Earth Week” to give away safer, organic shirts to students in exchange for any gently used t-

shirt which will then be donated to shelters and organizations within the Kalamazoo Community.

On the same note, in past years, there have been t-shirts that are distributed at this swap on behalf of the Western Student Association that have not been aligned with both the university and general student body sustainability initiatives. The University Pride Committee of the Western Student Association is looking to make this year's t-shirt swap more sustainable by purchasing eco-friendly, organic short sleeve t-shirts to align more closely with and to the goals and initiatives previously mentioned. This year's t-shirt swap is currently held Week. We will be located at the flagpoles from 11 a.m. to 3 p.m. WSA's University Pride Committee will facilitate the t-shirt swap where any student will have the opportunity to exchange their gently used t-shirt for a short-sleeve, eco-friendly Western t-shirt. This exchange will serve as an example for Western Michigan University that students are acknowledging that basic t-shirts are not sustainable for the long-term mission of this University.

The University Pride Committee of the Western Student Association is looking for some financial assistance in paying for the difference of 500 organic t-shirts that will be dispersed amongst the student population as compared to the original non-organic t-shirts. The representative of the student body, the Western Student Association, currently purchases basic t-shirts that do not promote sustainability. The student body has requested a presence of sustainability through the Student Sustainability Fee. Aligning with the student body's vision for this university, ordering sustainable t-shirts would be a great way in demonstrating to the student population that our student organizations are actively participating in making more sustainable choices. As stated earlier, the Western Wednesday event, where the shirts will be dispersed, is taking place the Wednesday of Earth Week as a way to celebrate the Earth Day holiday. The Western Student Association is a major leader in on-campus Registered Student Organizations and so these shirts would provide an excellent framework and leading

example for future students to recognize that more eco-friendly materials are something we are moving toward with a precedent for WMU's campus.

Amount Requested: \$1,499.99 Amount Allocated: \$1,499.99

5. Wildlife Cameras

Principal Investigators: Ben Giese

Faculty/Staff Advisor: Wil Reding, Environmental Studies

Abstract: The Student Wildlife Survey (SWS) will place camera traps (trail cameras in lockboxes, strapped to trees) on University properties (beginning with main campus, Asylum Lake Preserve, and Colony Farm Orchard) to facilitate research projects that develop our understanding of campus ecology and our impact on it. The SWS will encourage environmental mindfulness

among the student body by revealing their normally unnoticed cohabitants. As research develops we will be able to make better decisions when it comes to managing and preserving our campus habitat, and professors have already expressed interest in the data for use in labs. The SWS can be generating data within one month of approval and a significant amount of data should be available before the Fall semester begins. The data and equipment will benefit WMU students for years to come, and we can develop a better understanding of the campus that is a special place for so many past, present, and future students.

Amount Requested: \$1,469 Amount Allocated: \$322

6. Community Garden at the Kalamazoo Psychiatric Hospital

Principal Investigators: McKensie Ward, Sara Gariepy
Faculty/Staff Advisor: Carla Chase, Occupational Therapy

Abstract: A community garden at Kalamazoo Psychiatric Hospital (KPH) on the east campus of Western Michigan University would provide an opportunity for students and faculty of WMU, the employees and patients of KPH, and members of the Kalamazoo community to collaborate. This project will use therapeutic gardening as a means to achieve positive physical, mental, and social outcomes for KPH patients as evidence finds that interacting with nature positively influences and sustains physical and psychological health and wellness for adults, including individuals with mental health challenges (Adevi, & Lieberg, 2012; Wahrborg, Petersson, & Grahn, 2014). Other studies have shown that inpatients who participated in a gardening program at a mental health facility showed long-term reduction of depressive symptoms (Gonzolas et al., 2011; Kam & Sui, 2010). In their 2013 literature review, Camic Caltworthy and Hinds reported those with mental illness had a significant reduction in feelings of anxiety and depression as well as an improved sense of overall well-being following gardening-based therapeutic interventions.

In addition to benefitting the patients of KPH, this garden will also provide opportunities for students in the occupational therapy, social work and music therapy programs at WMU to interact with KPH patients as a part of internship and fieldwork experiences. The garden project will support a unique learning experience for students engaged in clinical practice, and provide KPH patients and staff, and WMU student volunteers opportunities to participate in an evidence-based activity understood to support human health and well-being and environmental sustainability.

Amount Requested: \$1,436 Amount Allocated: 0

7. Bike Repair Station

Principal Investigators: Luis Morales-Espinal and Keith Heatherly
Faculty/Staff Advisor: Jun-Seok Oh, Civil & Construction Engineering

Abstract: The benefits of biking are clear – moving commuters into a more active mode of transportation. Cycling brings less traffic congestion, lower cost for car parking maintenance, and improved public health. Without adequate support for cycling as a means of transportation, commuters will simply choose to continue driving. As stated in the WMU’s 2012 Climate Action Plan, “Improv(ing) infrastructure for non-motorized commuting options (mainly walking and cycling)”, offers the opportunity to foster cycling culture growth at Western Michigan University, while reducing GHG emissions.

DERO is a bike rack manufacturing company located in Minnesota, that designs innovative, high quality, and functional bicycling infrastructure we can rely on everyday. Last year, they came up with an upgraded design for their bicycle pumps that can resist all four seasons and requires minimal maintenance. Their “Fix-it Station” is basically a bicycle repair station that combines an air pump with basic tools, which are simple amenities that can turn a bad day into a lucky day. The air pump is designing for heavy-duty, repeated public use with a burly design meaning that this pump will continue

to work long after others have failed. The station also includes tools necessary to perform basic bike repairs and maintenance. The tools and air pump are securely attached to a stand with stainless steel cables and tamperproof fasteners.

These stations are in wide use all over the nation. Most of the universities in Michigan have already invested in their stations, i.e. Grand Valley State University has 4, Michigan State & University of Michigan both have 3 stations. The idea is to have a reasonable amount of these stations in the most visited and bike-friendly areas on our

campus; CEAS CHHS, and the new Valley 3 dining hall, are the three researched spots where we are proposing to locate these new stations.

Amount Requested: \$6,547 Amount Allocated: 0

Fall 2015 Student Sustainability Grant Proposals

Total Funds Requested: \$25,500.99

Total Funds Allocated: \$19,306.64

1. The WeGrow to Give Community Garden Project: At The Community Garden

Principal Investigator: Christine Uggeri

Faculty/Staff Advisor: Johnson Haas, Environmental and Sustainability
Studies

Abstract: The WeGrow to Give Community Project is a new project initiative that will take place at the WMU Community Garden during 2016 growing season. This project will bring students together for a common mission and provide a learning environment for sustainable gardening while fostering personal growth for students and improving the Western Michigan University and Kalamazoo community. The project will use five of the large garden plots at WMU Community Garden, where WMU students will grow produce using sustainable and low waste techniques. Produce grown by students will be donated to the organization Peace House on the Eastside of Kalamazoo to help feed families and children in our community. All Western students are welcome to join Volunteer Garden Day and/or Volunteer at the Vegetable Stand at Peace House. The presence of Western Students at the Eastside neighborhood will help Kalamazoo families and expose both families and students to sustainable gardening practices, broadening a mission of being a sustainable campus to the surrounding

community. The funding from the Student Sustainable Grant will provide the startup equipment and supplies necessary to make this project sustainable and successful. The WeGrow to Give Community Project supports the WeSustain community initiative at Western Michigan University and improves the experience of our student body and quality of life for the people of Kalamazoo.

Amount Requested: \$1,040.61 Amount Allocated: \$1,040.61

2. Green Chemistry as a Sustainable Approach to the Undergraduate Chemistry Laboratory

Principal Investigator: Casey Wright, Lainey Barber

Faculty/Staff Advisor: James Kiddle, Chemistry Department

Abstract: Among the many challenges to sustainability, organic chemistry laboratories in particular, generate large amount of wastes in the form of organic solvents each year. Organic solvents represents large amount of organic waste created by the undergraduate laboratory enterprise in the Department of Chemistry (over 70%) at Western Michigan University. The waste generated is both a financial burden on the institution because of the cost associated with the disposal as well as having a significant environmental impact. This project will focus on the application of the twelve principles of Green Chemistry to Design. Into the framework of the undergraduate chemistry laboratories sustainable practices that will reduce the impact of the experiments on the environment and use established matrix to demonstrate the efficiency of the adopted experiments.

Amount Requested: \$4,969

Amount Allocated: \$4,169

3. Sustainable Light Activated Catalysts

Principal Investigators: Gregory Johnson, David Sellers

Faculty/Staff Advisor: Elke Schoffers, Chemistry Department

Abstract: Increasing energy demands and rising concerns over greenhouse gas emissions have made research into clean and sustainable energy sources urgent and pivotal. Solar energy can be part of the solution. Analogous to chlorophyll in plants, light activated catalysts are chemical that are able to harness the energy from light to drive chemical reactions or to store and use energy via solar cells. A majority of the currently known light-activated catalysts use carbon containing compounds bound to ruthenium and iridium. These metals are expensive and have large environmental footprint associated with their extraction, and are limited to non-renewable resource. It is likely that within this century, the supplies of these two metals will diminish substantially. Iron would be the most ideal alternative. It is roughly 500,000 times more abundant. Our lab has synthesized a library of compounds in previous projects that are able to bind to metals like iron. They are promising precursors for developing light activated catalysts. In this project, we will prepare earth-abundant metal complexes with our existing library of compounds and screen them for their application as catalysts. We will expand WMUs capacity to conduct research by adding new functionality to current equipment. Students will help broaden our research into solar cells on campus. Therefore, our research team will help advance WMUs sustainability efforts.

Amount Requested: \$4,999

Amount Allocated: \$4,999

4. Locally Sweet Treats

Principal Investigator: Anja Grammons, Lauren Rabish

Faculty/Staff Advisor: Caroline Webber, Dietetics

Abstract: This proposal was submitted by ten Western Michigan University dietetic interns. The WMU dietetic internship concentrates on sustainable food systems. We have participated in many sustainability projects during the internship and would like to expand on those projects by producing two different food products that focus

on sustainability. "At its core, sustainability is all about improving the human condition-now and into the future-while adapting our activities to fit what nature can provide." Michigan has all the products we need for our project, now it is up to us to turn those products into something community would need.

We hope that by producing a sustainable product, we can reach out and introduce nutrition ideals through these goods. The two products that will be produced are pear sauce and cookie made with gluten-free ingredients and agriculturally sustainable farming methods. The key ingredients will be made or grown in Michigan. Using Michigan ingredients helps support the WMU Sustainability focus by putting funds back into the local community.

This grant will cover these expenses: ingredients for the products, packaging, ingredient labels and marketing fliers. By receiving this grant, the WMU interns can demonstrate the importance of sustainability related to food and nutrition in WMU community.

Amount Request: \$235 Amount Allocated: \$235

5. A Proposal to Hold a Bike Safety Day on Campus

Principal Investigator: Annalisa Wilder, Chiante Lymon

Faculty/Staff Advisor: Chris Sligh, SALP

Abstract: Western Michigan University has continued to be a beacon for sustainability, advancing the university in many different fields. Bikes have become a popular mode of transportation for students here at WMU. With growing bike usage, It is important to continue to promote bike safety . We propose putting on an event that would promote bike safety. We would work with the Western Student Association to put on a bike safety awareness day. We would also work with other public universities in Michigan to ensure that we all hold our Bike Safety Day on March 23rd, 2016. We will put posters up, start a Facebook event and work with Western Student Association to

promote the event. We will be passing our bike bells and reflective bike spoke sliders.

Amount Requested: \$5,550

Amount Allocated: \$5,550

6. Sustainable Bicycle Generator

Principal Investigator: Erika Fogtik, Kelsey Pitschel

Faculty/Staff Advisor: Dr. Miller, Electrical Engineering

Abstract: Human powered energy is an underutilized and ubiquitous type of renewable energy that is able to combat small-scale dependencies on natural gas and coal. The bicycle generator is a form of harnessing energy that ranges in complexity, materials and system output. The Sustainable Bicycle Generator project focuses on redesigning a bike generator to be sustainably sourced, efficiently competitive, and cost effective and aesthetically pleased for home and office applications. The overarching objective of the project is to create a turnkey solution for hands-on learning about energy and self-sufficiency in order to develop a deeper understanding of how humans develop and consume energy. Additional benefits include promoting well-being through exercise even during winter months, a modular system that is portable and replicable, and a solution for remote energy needs via portable batteries. The generator will act as add on to trainers for stationary use of a bicycle with easy set up and teardown. Main components of the system shall include a motor, a battery, an inverter, and an educational display screen that tracks calories burned and kWh generator. An additional objective of the project is to conduct a Life Cycle Assessment of the components in order to determine how much pedaling must occur in order to offset the upstream and downstream impacts of building the bike generator.

Amount Requested: \$ 3283.03 Amount Allocated: \$3283.03

7. Drive Safe Kalamazoo Tablet Proposal

Principal Investigator: Keith Meyers

Faculty/Staff Advisor: Kate Bates, SALP

Abstract: Drive Safe Kalamazoo – a registered student organization and 501(c) 3 non-profit – provides safe, non-judgmental and confidential rides home to Western Michigan University Students during the school year. Each night of operations, somewhere between 6-8 sheets of paper is used for assorted contracts protecting the organization, volunteer and patrons, all while adding up to 500 sheets annually. By using Refurbished iPad Mini 2 Tablets with a pdf signing application, we will be able to reduce that number to zero or very few sheets per night. It would also reduce the cost of space required to provide efficient services to the students, reduce the cost of funding our organization, and possibly be able to spread to other safe ride programs across the country as we attempt a new method of operations. This should cost about \$1,650 to begin a long term savings on paper, ink and money.

Amount Requested: \$1,624.35 Amount Allocated: Denied

8. Growing Hemp Based Insulation

Principal Investigator: Jorge Cortez

Faculty/Staff Advisor: Dr. Hastings, Global & International Studies

Abstract: We propose to have Gibbs House grow and install its own hemp based insulation through the use of hemp hurds, which can be specially molded into various construction materials. In this way Gibbs House can continue to promote economic sustainability for Western Michigan University. Although the Gibbs house is a leading model of sustainability, it is not a symbol of economic heating and cooling efficiency.

Amount Requested: \$3,800

Amount Allocated: Denied

Spring 2015 Student Sustainability Grant Proposals

Total funds requested: \$24,639

Total funds allocated: \$23,240

1. Sustainable Student Centered Café

Principal Investigators: Nora Gimpel, Taylor Sawyer

Faculty/Staff Advisor: Carol Weideman

Abstract: Western Michigan University is working on building a culture of Sustainability. Part of the mission of this project involved propelling WMU forward. Supporting local sustainable food systems by opening a Sustainable Student Centered Café is the next step to increasing our campus sustainability. Our grant is going to fund filling the café space with commercial kitchen/café equipment as well as sustainable options for utensils and carry out boxes. This will promote sustainability on campus by providing: healthy food options, educational experiences, increased retention student interactions and support to local economy. The services provided by this café will allow the WMU community to collectively come together and make a positive impact for the future. Besides just offering healthy choices, it would allow students to consume food sourced by local suppliers. Education will help influence students to make healthier choices. By embracing student talents and delivering a venue in which they can express themselves, students can grow as individuals and foster a community culture on campus. Furnishing the space will allow the café to serve food sooner and in the “phased-in” process, with decreased monetary constraints.

Amount Requested: \$8,979

Amount Allocated: \$8,979

2. Sunseeker Solar Array Encapsulation Project

Principal Investigators: Bryan Harris, Cameron Knight

Faculty/Staff Advisor: Bradley Bazuin, Electrical and Computer Engineering

Abstract: The Sunseeker Solar Car Team at Western Michigan University is looking for ways to further improve the efficiency of their next generation solar vehicle. To do this, the team needs to design the necessary circuitry, structure, and hardware. An analysis of the system will be completed to make certain that the design is optimized within the 2016 American Solar Challenge Regulations. This work could prove useful in the calculations of the energy offset provided by placing solar cells on commercial vehicles.

Amount Requested: \$8,851

Amount Allocated: \$8,851

3. Carbon Neutral USB-Drives – RSO Orientation

Principal Investigators: Krysta Coleman, Jesus Romero

Faculty/Staff Advisor: Nicole Haase, RSO Development Advisor of SALP

Abstract: The RSO Orientation has been conducted in various formats for many years for students and RSOs that apply for SSG, WSA-AC, GFAC and SCC funds. Each academic year, RSOs and other grant receivers are required to attend this workshop. Traditionally, during these workshops, mandatory reading materials have been handed in paper format of approximately 36-40 pages. With funding from the SSG, students that attend these workshops will receive these reading materials, payment forms, sample forms, sample contracts, presentation notes, RSO Handbook, etc., in electronic format via a Carbon Neutral USB-Drive made partially from hardwood from a FSC certified source. This potentially reduces the amount of ink, electricity and paper for this project by over 15,200 pages per academic year, thus further increasing the Sustainability of the University and its undergraduate and graduate students. The USB-Drives will bear a logo

or other acknowledgement indicating that this project was funded by SSG-AC, hence promoting and bringing further awareness of the culture of Sustainability at WMU.

Amount Requested: \$4,410 Amount Allocated: \$4,410

4. Western Student Association T-Shirt Swap Grant Proposal

Principal Investigators: Courtney Cox

Faculty/Staff Advisor: Chris Sligh, Director of SALP

Abstract: Starting in the 2009-2010 school year, the Western Student Association developed the t-shirt swap that took apparel from other campuses, such as University of Michigan, Michigan State University, etc., and traded it for a brand new WMU shirt. We are proud to be bringing this pride initiative back to campus; however things are going to look a little different this year! We have learned that T-shirts can be pretty harmful to the environment and also not all students have apparels from other schools to swap. The WSA has decided to partner with “Earth Week” to give away safer organic shirts in exchange for a pledge to do something good to the environment. We will also encourage the donation of any gently used clothing to give to shelters and organizations in Kalamazoo community.

Amount Requested: \$1,000 Amount Allocated: \$1,000

5. Habitat for Humanity Rain Garden

Principal Investigators: John Smith

Faculty/Staff Advisor: Peter Strazdas, Facilities Management

Abstract: The Habitat for Humanity Rain Garden is a part of the 2015 Global Youth Service Day and an AmeriCorps Legacy project that works with Kalamazoo Valley Habitat for Humanity. This project is planned for April 18th. The current Habitat plan is to collect storm water in a

depressed retention area with tubes that will hold the extra water and slowly filter it back into the ground. However, there is currently no plan to filter possible contaminants that enter the collection basin. This project will create an environmentally sustainable solution by planting native plants that will naturally filter the storm water. This project will teach you how to preserve their communities by engaging young adult volunteers from local high schools and Western Michigan University. The goal of the project is to create empowered youth that will take the charge and improve their communities through environmental sustainability. This project will show Habitat is committed to lessening its environmental impact to the communities it serves and providing low cost services to Western Michigan University students through the Habitat ReStore. This project will increase the awareness of these services which include low price furniture, rugs and small repair items that can benefit both students living on and off campus with purchasing needed items. With increased awareness of the ReStore students can reduce the amount of waste they produce during the time they move out of the resident halls, apartments or their off campus living locations through donating unwanted and unneeded goods.

Amount Requested: \$ 1,400 Amount Allocated:\$0

Fall 2014 Student Sustainability Grant Proposals

Total funds requested: \$47,634.03

Total funds allocated: \$43,938.89

1. Leaders Unplugged Backpacking Gear

Principal Investigators: Candace Faistenhammer, Jesus Romero

Faculty/Staff Advisor: Kate Bates, Student Activities and Leadership Programs

Abstract: The Leaders Unplugged programs was developed by Student Activities and Leadership Programs (SALP) in 2013 as an outdoor leadership experience where students would go on a 25-35 mile backpacking trip in the week between the Spring and Summer I semesters. Students who participated in 2013 and 2014 have reported that they met people from diverse backgrounds, gained leadership skills, had personal breakthroughs and gained a sense of appreciation for the environment they live in.

Students, no matter their outdoor experience, can participate: participants have included students who have never camped in their life to experienced

backpackers. To prepare students, SALP staff train students in gear, food preparation, leave no traces practices, etc. Students are expected to pay a \$25 registration fee to help with travel expenses, provide their own food, and procure gear to the best of their ability.

Over the years, SALP has begun to accrue communal gear for participants to share. This year SALP is expecting to double the size of the program and hopes to expand the program to twice a year in the future. Because of this, we are looking to purchase enough gear for up to 20 participants to use. Better (and lighter) gear allows for participants to have a more positive experience by not having such heavy loads, staying dry and warm. SALP is looking for funding to purchase 4 person tents, Water filters, stoves, communal pots, and sleeping bags.

Amount Requested: \$4,964.15 Amount Allocated: \$3,440

2. Solar Car: Energy Storage Optimization

Principal Investigators: Kate Haubert, Robert Galman

Faculty/Staff Advisor: Dr. Bradley Bazlin

Abstract: The Sunseeker Solar Car team at Western Michigan University is looking for ways to further improve the efficiency of their next generation solar vehicles. The project aims to accomplish their goal through coupling a regenerative braking system to a super capacitor bank in order to more efficiently store braking energy. To do this, the team needs to design the necessary circuitry, software, and hardware. An analysis of the system will be completed to make certain that the extra weight carried by the car is more than offset by the energy recovered from more efficient braking. This work, if successful, may prove to be useful in the hybrid automotive industry as a means to increasing vehicle range.

Amount Requested: \$3,065.39 Amount Allocated: \$3,065.39

3. Energy Reduction with the WeMo Switch

Principal Investigators: Kate Binder

Faculty/Staff Advisor: Dr. Ron Van Houten

Abstract: Western Michigan University is on the forefront of behavior changes for energy reduction research. A grant funded research project studying the effects of building energy dashboards is currently underway. In an effort to round out this research study by including empirically supported research plans, the purchase of 24 advance power strips (APS) is proposed. APS devices allow building users to control outlets in their work or living spaces by setting on and off schedules and providing feedback about outlets electricity use. Plug-load electricity use comprises a significant amount of the electricity use of entire buildings. APS devices with scheduling capabilities have been proven effective and can reduce plug load electricity use by approximately 40-50%. The devices will be tested in a variety of

settings on WMU's campus including residence halls, campus apartments, office spaces and computer labs. Results will be compared against findings from the energy dashboard project and recommendations will be presented to campus energy stakeholders. The project has the potential to impact the way we use electricity on campus and could either lead to the justification of the purchase of additional devices for permanent use or to further lines of research and additional recommendations. Other students will be included in the research phases, as participants and research assistants will have access to the devices once the research is complete.

Amount Requested: \$1,439.76 Amount Allocated: \$1,439.76

4. 2015 North American Beekeeping Conference

Principal Investigators: Ali Leist & Shaana Way

Faculty/Staff Advisor: Lynne Heasley

Abstract: Beekeeping at WMU has gathered interest from students, educators, and press since the development of the apiculture-training installment in 2013 through funds provided by the Student Sustainability Grant. The objectives of the research hives are for education on pollinator ecology, environmental awareness, and enjoyment of local honey and other bee products. Though many individuals in the Kalamazoo beekeeping community have contributed to the education and expansion of the hives, WMU apiary and all programs associated with it remain primarily managed by student volunteers. We propose that three undergraduate students attend the 2015 North American Beekeeping Conference and Tradeshow in Anaheim, CA January 6-10, 2015 to attend lectures and workshops related to apiculture operations, avenue of research and sustainable practices. We believe this conference and tradeshow will aid in WMU students becoming better educated on the culture of beekeeping and teaching practices that can be applied at our own hives. At this conference, three students will also present a poster describing SSE's

acquisition of the hives through the Sustainability Grant, educational goals related to the hives, and any other relevant information related to the WMU Office for Sustainability's initiatives concerning sustainability and the conservation of pollinators. As attendees of this conference, the three students will represent WMU's OfS and Students for a Sustainable Earth as models for other educators to engage in sustainable, educational projects that will enhance their institutions. After the conference a public presentation describing the experience, including pictures and detailed notes, will be held.

Amount Requested: \$4,786.57

Amount Allocated: \$2,947.65

4. Gibbs Farm Compost-Powered Water Heater Principal

Investigators: Kelsey Pitschel & Eli Lowry Faculty

Staff Advisor: John Spitsbergen

Abstract: The Gibbs Farm compost-powered water heater is a student-led initiative to design and construct a small-scale renewable energy source for the ground heating of the westernmost hoop house. A 60-cubic-yard mound of reclaimed organic material will act as a feedstock for heat-generating thermophilic bacteria. Water-filled tubing will run through the mound and into the hoop house to transfer heat from the mound to the hoop house seedbeds. The circulating hot water will keep the ground temperature above freezing from October to April and allow for the development of crops, vermicomposting and black soldier fly larvae. Following April, when the feedstock no longer generates heat, the finished compost will be used for soil amendment at the Gibbs Farm. The project will not only provide practical solutions for the off-season advancement of crops, but will also provide a platform for future research development based on long-term data collection. Adafruit sensors will gather data for humidity, temperature, pressure, and soil moisture using Raspberry Pi and Aduino Uno microcontrollers

that compute data for logging. The proposal also includes the purchase of an Agrilab Feasibility Study to further guide the system design and workshop that will be held in the fall of 2015. The workshop will be open to the community and hosted by Gaelan Brown. Brown is the author of “The Compost-Powered Water Heater” and has constructed many efficient Jean Pain style systems across the country. The scope of this proposal includes the cost for design, equipment, supplies, and hosting feeds necessary to construct a fully functional compost heating system. The final system is intended to act as a proof-of-concept that can later inform and propose the integration of compost heating technology on a larger scale at Western Michigan University.

Amount Requested: \$6,486.97 Amount Allocated: \$6,486.97

6. LED Research Station

Principal Investigators: Cody Potter, Thinh Nguyen

Faculty/Staff Advisor: John Kapenga, Computer Science

Abstract: As we make our way through the 21st century, we are focused on the impact our human footprint has on our environment and we seek for new innovative methods to save energy, promote recyclability, and enhance our daily life. With new LED technologies rising, there are many opportunities to take part in the research and contribute our findings to the growing industry. Our proposal to create and LED research station is one of those opportunities.

With the LED research station, students at Western will be able to research and test various LEDs. This workstation will give students the hands on approach to work and check various manufacture claims. One of these claims is the negative effect blue LED lighting has on our environment and also human life cycles. They will be able to research these LED lights as they test various variables in order to find optimal results. This research can be used to find the best lighting for our Residence Halls, as well as various other buildings on campus to make

sure that we are creating a sustainable, healthy environment for future Broncos. The movement to more sustainable LED lighting is the future. In order to get there, research is needed. We would like to provide opportunities for students at WMU to be a part of that research and to shine the University under new light.

Amount Requested: \$7,525 Amount Allocated: \$7,525

7. Ultros 3D Printer and Filament Extruder Principal

Investigators: Andrew Brower, Quincy Campbell

Faculty/Staff Advisor: John Kapenga, Computer Science

Abstract: 3D printing is an emerging technology, which allows users to manufacture any part they can imagine from plastic in a relatively short time. Objects can be designed with 3D imaging software or download from the Internet to be printed on a desktop. A delta style printer features 3 vertical rods, which may be extended to the print volume as tall as desired. We build two delta printers for use in the computer science department, and purchase a Filabot extruder, which can recycle plastics into new filaments, which can be used for printers.

Traditionally most plastic items we purchase at stores are shipped from China. Factories produce these parts, and ship them overseas to stores where they might be purchased. Any products not used purchased would then be thrown away. A 3D printer avoids this by allowing consumers to only print what they need. Combined with a filament extruder, this allows the consumers to recycle

items in their own home once they are no longer needed, rather than throwing them away or shipping them to be recycled.

There is currently an industrial grade filament extruder in the plastics lab at WMU, but due to safety and damage concerns, it is not usable by students. A Filabot extruder is much smaller, simpler, and safer, and

could be easily and safely used to create filament from any materials students desired without supervision.

The delta printer and the Filabot are both constructed from common parts and documentation is readily available on the Internet. Should either of the devices encounter problems, it would be easy to get replacement parts produced by another printer, or purchased from a regular hardware store.

Amount Requested: \$4,333.52 Amount Allocated: \$4,333.52

8. Integrated Aquaculture Feed

Principal Investigators: Carlos Daniels, Kyle Simpson

Faculty/Staff Advisor: Mark Delorey, Financial Aid Department

Abstract: The purpose of this project is to determine whether black soldier fly larvae spirulina, and crayfish are suitable in combination as feed for aquaculture. This investigation stems from previous and ongoing SSG research with aquaponics. Several team members have been operating a small-scale aquaponics system in the

WMU Office for Sustainability and are currently in the process of designing a larger pilot system to be installed at WMU's Gibbs House property. With a larger system comes a higher feed cost; the intention of this project is to reduce that cost by creating a system to produce sustainable feed on site. Feed will be produced onsite by repurposing fish waste as fertilizer for spirulina. This is a form of aquaponics in principle, although in traditional aquaponics nutrients from fish effluent are used by produce intended for human

consumption. In the Gibbs House aquaponics system, traditional produce will be grown for human consumption, while excess fish effluent will be used for production of spirulina. Spirulina will be a nutrient- dense feed for both fish and crayfish. The crayfish will then be used as a supplemental feed for fish. Additionally, black soldier fly

larvae will be fed post- consumer food waste collected from campus. BSFL are high in protein and fats, and they reduce the presence of common pathogens such as E. coli. The BSFL research serves two purposes: 1) to test BSFL in combination with spirulina and crayfish as an alternative to store-bought fish feed 2) to reduce food waste on Western Michigan University's campus. Currently 50% of the recurring cost in aquaculture is feed. This research may reduce this recurring cost in addition to recycling WMU food waste as edible, low-cost produce and fish for campus.

Amount Requested: \$8,741.89 Amount Allocated: \$8,741.89

9. Michigan MI-Plate Guide 2.0

Principal Investigators: Courtney Gullett, Julee Reed

Faculty/Staff Advisor: Dr. Caroline Webber, Family and Consumer Sciences

Abstract: Sustainability in the food system is essential to preserving the health of the land as well as the health of the people. One way to create a more sustainable food system is to encourage the consumption of local, seasonal foods. Increased consumption of local, seasonal foods promotes both regional and global sustainability by decreasing food miles, preserving farmland, and decreasing spread of food born contamination. Additionally, research has shown that young adults aged 18-23 with increased culinary confidence consume fast food less often and are more likely to meet desired dietary objectives. As such the goal of our project is to create a web-based resource that contains seasonal recipe ideas, how to videos for creating some of our recipes, and resources for where to purchase local and seasonally available products.

Our proposed project is an expansion of the previously successful MI-Plate Guide, which is based on the United States Department of Agriculture's

MyPlate tool. By focusing on culinary skill development our project is also similar to the Michigan State Extension Cooking Matters course, which teaches adults and teens how to cook healthfully on a budget. To ensure this project benefits all students on campus we plan to do a cooking demonstration using one of the recipes from our digital cookbook at an event in the Student Recreational Center. We hope this initiative will increase student's self-efficacy in regards to cooking and will be a piece of the groundwork for the proposed student-centered sustainable café in the future.

Amount Requested: \$3,200 Amount Allocated: \$1,710

10. Sustainable Shade Structures as part of the Fountain

Plaza Remodel

Principal Investigators: Zachary Morhous, Johan Manuel Mejia z
Faculty/Staff Advisor: David Middleton, Industrial and Entrepreneurial Engineering

Abstract: We are a joint team of three IEE (Industrial and Entrepreneurial Engineering) students, and three ECE (Electrical and Computer science Engineering) students, working with Landscape Forms of Kalamazoo, tasked with designing sustainable, student friendly shade structures for Western Michigan University's Office of Campus Planning, as part of the larger Fountain Plaza Redesign Project already under way. We are asking for grant money to help fund the design process and the construction of one or two working models. These models will be used to assess student interests and opinions

before we finalize the design for production by Landscape Forms beginning summer of 2015. Campus Planning hopes to have the final product installed in the plaza by the beginning of the Fall 2015 semester. The final structures are to be produced by Landscape Forms custom department, Studio 431, who has graciously volunteered to donate their time to both manufacture and help build us through the design process of these structures. Campus Planning will

pay for the remainder of the production cost out of the budget already designated for the Fountain Plaza Redesign. However, it should be made clear that this grant application is only to help fund the design process and the construction of working models, and will be totally separate from the production and installation costs of the final products.

Amount Requested: \$1,377.95 Amount Allocated: \$1,377.95

11. LHC Solar Charging Station

Principal Investigators: Mark McKeon, Latif Eyada Ibr Ibraheem

Faculty/Staff Advisor: Denise Keele: Associate Professor ENV5

Abstract: The LHC Solar Charging Station Project is for the installation of a mobile electronic device solar charging station in the LHC. It will be carried out over two phases, the first being in spring semester when research, project assessment, planning and material procurement will happen. The second phase will be the acquirement of final resources and the construction for this project. The overall purpose of this project is to provide students of WMU with location using renewable energy to power their electronic, devises such as laptops, cellphones, and tablets. Benefits will be longer lasting, tangible, and intangible. Tangible benefits include financial saving for the university, data, reduction in university fossil fuels use, carbon emissions. Intangible befits include an improved in the image of WMU to potential students and in the environmental rankings, pride and awareness of renewable energy

amongst students, direct access for students to a renewable energy source that they can easily witness, and an increase in campus wide environmental conscientiousness and culture. The south side of the LHN common room has been chosen because it receives direct sunlight all day, It's open to the whole student body, is continuously used throughout the day, provides a manageable environment for data collection, and is visible to students on main campus. From the implementation of this project, the university will gain valuable experience and information about the demand for solar energy on campus and the cost/benefits of a solar project.

Amount Requested: \$9,048.15 Amount Allocated: 0

12. Reusable Bags

Principal Investigators: Baron Hoeve, Aaron Clark, Michelle Schmitt
Faculty/Staff Advisor: Laura Hastings: Assistant Professor on Political Science and Interim Director of the Global International Studies Program

Abstract: One of the challenges facing human interactions with the environment is the use of plastic, in particular plastic bags. We wish to apply for a sustainability grant for \$1,101.83 to supply incoming students with reusable totes to be used at Western Michigan University stores, as well as in the community for items such as general merchandise. West Michigan University currently uses over 50,000 plastic bags per year, at a cost of \$12,000. The reusable bags would be distribute to incoming students along with the EcoMugs, or could otherwise be picked up at the sustainability office for a modest fee. Also like the EcoMugs, they could be brought to specified areas possibly for discounts or other store incentives. We would also like to provide students with some information about where they could reuse the bags (Wal-Mart, Meijer, any campus store) and why they should, to be sent out through email or else printed recycled paper. We also suggest

labeling the bags with the Western Michigan University logo and provide some information about the sustainability office, so that new student could familiarize themselves with the sustainability efforts at Western Michigan University. If they were to be used in local stores with possible incentives this would help future their sustainability efforts in and around the greater Kalamazoo area as well.

Amount Requested: \$1,103.83 Amount Allocated: 0

13. Sustainability Lecture Series

Principal Investigators: Todd Holquist, Kathryn Hemmen

Faculty/Staff Advisor: Laura Hastings: Assistant Professor of Political Science and Interim Director of the Global and International Studies Program

Abstract: College students at WMU are often unaware of their unsustainable practices or are unsure how to live a more sustainable lifestyle. To educate the student body on sustainability we have proposed a 6-week hands-on lecture series taught by local experts. These six lectures will be on household item repurposing, recycling, how to make a meal from sustainable foods, water conservation, how to garden, and how local actions impact the environment on the global scale. By starting the conversation between students' interaction with the local community we will foster a community of sustainability here on Western's campus.

Amount Requested: \$609 Amount Allocated: 0

Spring 2014 Student Sustainability Grant Proposals

Total funds requested: \$20,349.43 Total funds allocated:
\$20,349.43

1.Hullabazoo: A celebration of DIY (Do it Yourself)

Principal Investigators: Janet Aladetohun.

Faculty/Staff Advisor: Donald Cooney, Department of social work,
Kalamazoo City Commissioner

Abstract: Hullabazoo is a dynamic, inclusive, horizontally organized event that involves all-day local music, a local artisan market, and free workshops throughout the day. Hullabazoo is a true celebration of DIY (Do-it-Yourself) culture. This event is in the heart of campus toward the close of the spring semester, on April 5. While buds and flowers are blooming, we will unite for our third annual Hullabazoo to provide workshops on topics such as zine making, hand-made book binding, screen printing, bicycle maintenance, herbalism and a panel of local farmers. By providing workshops, students leave Hullabazoo with new skills, and a small fire of inspiration in their bellies to do things for themselves, instead of relying on super stores and fossil-fueled car culture to meet their needs. The Wesley Foundation of Kalamazoo is donating building use for this project for the third year. The Hullabazoo is the explosive finale celebration at the end of a fun-filled, social justice oriented peace week. The event begins on March 29 and spans until April 5.

The planning organization is a hub for student activism on Western's campus. We organize students around issues of social, environmental, and economic justice. We have continuously mobilized students around issues of peace and social justice for over 30 years. Peace Week is an annual spring event on campus, and people keep an eye out for it. Hullabazoo brings together a diverse group of people from campus, and the community to unite around a localized economy, skill learning, creativity and resilience.

Amount Requested: \$1,480.89 Amount Allocated: \$1,480.89

2. Michigan Mi-Plate Guide

Principal Investigators: Alanna Troyer, Elizabeth Palmer

Faculty/Staff Advisor: Gary Bischof, PhD, interim Chair, FCS

Abstract: Sustainability in the food system is an important part of responsible environmental stewardship as it helps preserve the health of both land and people. Consuming more local and seasonal foods can decrease the distance that food travels, reducing carbon emissions. Decreasing the length of time between harvest and consumption of food can also result in greater retention of nutrients. Increasing nutrition in the food supply and reducing harmful pollution are two ways we can support a sustainable food system. It is therefore our goal with this project to increase WMU students' knowledge of how to select and prepare seasonal foods grown in Michigan in order to promote sustainability.

Based on USDA's ChooseMyPlate tool, we plan to design and produce the Michigan Mi-Plate Guide, a three-fold brochure which will open up to reveal a diagram of the state of Michigan divided into 4 quadrants, plus the U.P., representing five food groups. Text will include lists of Michigan foods from the four seasons, and feature healthy uncomplicated recipes that will appeal to students with limited time and financial resources. It will also explain how their food choices can impact the environment and local economy in addition to their own health. We hope this will encourage students to try new foods and cook more for themselves. The guides can be distributed through sites frequented by all students such as Sindecuse Health Center, Bernhard Center, and the Student Recreation Center.

Amount Requested: \$1,800 Amount Allocated: \$1,800

3. Solar Car Array Optimization Electronics Principal

Investigators: Vincent Kucway and Karen Haubert

Faculty/Staff Advisor: Bradley Bazuin, ECE Dept. Faculty

Abstract: Solar technology offers one of the most promising paths to a future of sustainable personal transportation with 100% renewable, zero-emission power. This project involves optimizing the efficiency of the solar array on an all-electric vehicle through the evaluation and improvement of the solar charging electronics. The most vital system on a solar powered vehicle is the solar array, which serves as an environmentally responsible energy source. When designing a high efficiency solar array, an essential consideration is the implementation of a solar array system, amplifying the overall energy efficiency of a solar powered vehicle. The design and fabrication of solar powered vehicles actively demonstrates the capabilities of solar energy for everyday transportation, promoting sustainable energy use and engineering. With the expansion of these capabilities at WMU, students, as well as the surrounding community, are able to engage in the promotion and advancement of these technologies at a more relatable level. Our proposal focuses on procuring multiple custom electronics modules in order to increase the efficiency of our solar array, therefore expanding the capability of our team to reach public events throughout the community while granting invaluable experience to our members through testing and implementation of these devices.

Amount Requested: \$6,321.74 Amount Allocated: \$6,321.74

4. Filtered Hydration Station in Wood Hall, Third Floor

Principal Investigators: Shaana Way and Nora Gimpel

Faculty/Staff Advisor: Brian Peterson, Assistant Professor

Environmental and Sustainability Studies

Abstract: Over 60 million plastic water bottles are sent to landfills or are incinerated each day in the United States. To reduce these

destructive environmental practices, WMU endorses sustainable efforts that benefit students and faculty alike. Several buildings across campus have hydration stations that quickly dispense clean, refrigerated water that has reduced metallic elements and improved taste. However wood hall lacks such an

apparatus. The third floor of wood is home to several science departments that endorse sustainable efforts, including GEO, CHEM, BIOS, ENVS, and PSY departments. This key location would greatly benefit the faculty and students that operate in this high-traffic area while simultaneously raising awareness of WMU's sustainability endeavors. Additional benefits of this modification include hands-free refills, which reduce contamination. Filtered water drinking fountains such as the Elkay Hydration Station will discourage purchasing bottled water, reduce plastic waste, and represent the university's public and proactive position to foster sustainability.

Amount Requested: \$7,500 Amount Allocated: \$7,500

5. Insect Walls and Workshop

Principal Investigators: Jared Aslakson and Kenneth Crocker

Faculty/Staff Advisor: Stephan Keto. Natural Areas and Preserves Manager

Abstract: In recent years, populations such as bees and wasps have been declining. Although the reasons for these trends are manifold, a major contributing factor is habitat loss. Insects, particularly bees and wasps, provide a major service through pollination and play a number of roles enhancing ecological integrity and stability. Although pollination is associated primarily with honeybees, solitary bees and wasps that are native to Michigan provide the same services. Additionally, these insects have a special relationship and are especially beneficial to native plants. To that end, this grant would fund the construction of three insect walls in addition to a construction and

educational workshop available to students and the public. Insect walls are constructions designed to provide habitat for native, solitary bees and wasps. Two of which would be installed at the Gibbs House property. The third would be installed at the community garden at the Stadium Drive apartments. These locations would be ideal since both have vegetable and native gardens that would benefit from the pollinating services provided by these insects, including a food forest planned at the Gibbs House property. The workshop would be held at the Gibbs property during one of the summer sessions, and would include the construction of the three walls to be installed on campus, in addition to miniature walls that can be taken home by participants. Not only would this encourage beneficial insect populations on and off campus, it would spread the university's image of commitment to sustainable agriculture.

Amount Requested: \$1,672.80 Amount Allocated: \$1,672.80

6. Permanent Recycle Signs for Welcome Week

Principal Investigators: Adam Williams.

Faculty/Staff Advisor Dr. Heather McGee, Psychology

Abstract: The beginning of the new school year can be a busy time for college students. The university has less than a week to move all of the students into the dorms. To act more efficiently, the university provides big recycle bins in front of each dormitory. In the beginning of the year, all the students have brand new things such as laptops, TVs and refrigerators that are still in cardboard boxes that came with the purchase. Within these cardboard boxes there is Styrofoam, plastic, bubble wrap and other materials that can be recycled. The biggest opportunity for wasting and recycling is when the students are moving into the dorms. The bins that are provided have inadequate labeling, which results in confusion for the students. One solution is to identify waste and recycle respectfully by having big signs in front of them that identify what type of waste goes in each. This proposal has the

opportunity to reduce the landfill waste, and increase the recycle waste during moving week on campus. Making the signs reusable will also reduce the stress and time put into making signs each year for the recycle bins. This proposal will have a major impact on the environmental footprint of our campus

Amount Requested: \$1,074 Amount Allocated: \$1,074

7. Western Student Association T-Shirt Swap Grant

Proposal Principal Investigators: Connor Smith.

Faculty/Staff Advisor: Chris Sligh

Abstract: Starting in the 2009-2010 school year, the Western Student Association developed the t-shirt swap that took apparel from other campuses, such as the University of Michigan, Michigan State University, etc., and traded it for a brand new WMU shirt. We are proud to be bringing this pride initiative back to campus; however things are going to look a little different this year. We have learned that t-shirts can be pretty harmful for the environment and also not all students have apparel from other schools to swap. The WSA has decided to partner with “Earth Week” to give away safer, organic shirts to students in exchange for a pledge to do something good for the environment. We will also encourage the donation of any gently used clothing to give to shelters and organizations within the Kalamazoo community.

Amount Requested: \$500 Amount Allocated: \$500

Fall 2013 Student Sustainability Grant Proposals

Total funds requested: \$15,386.45

Total funds allocated: \$13,936.45

1. Reinvestment in our WMU Community Garden

Principal Investigators: Weston Hillier and Scott Warner.

Faculty/Staff Advisor: Todd Barkman, Assistant Professor, Department of Biological Sciences.

Abstract: In this proposal we seek to promote a campus culture of sustainability by reinvesting in the Stadium Drive Community Garden in 2014. Management will be conducted by Students for a Sustainable Earth and BioClub (Dept. of Bio Sciences). These organizations have a long history on campus, value sustainability and already have a stake in the community garden. Through educational workshops, community events, collaborative work and provision of a space for growing food, we seek to spread the spirit of sustainable food production and preservation throughout campus and to the wider community. The ever-growing awareness of foods impact on our health, community relationships, and economics is evident right here in Kalamazoo in many wonderful ways. Specifically, KVCC has proposed to build a \$42 million state of the art food sustainability and wellness campus right downtown. We want to see WMU continue to take action on these important topics as other institutions.

The community garden has been well established since 2010, when it was founded as a Student Garden Organization project. Stewardship passed to the Office for Sustainability (OfS) in 2012, who maintained it through the 2013 season. As the OfS Prepares to build a production garden at the Gibbs House, they are ready to pass the community garden management over to interested student organizations. As sustainability-minded organizations with lots of internal interest, BioClub and SSE are logical successors in this endeavor.

Our budgeting seeks to reflect WMU's commitment to being leaders in ecological and cultural sustainability. By using organic methods free of synthetic chemicals for the need of transportation and packaging, we will set an example of ecological responsibility. Through comprehensive plot promotion, we hope to gain cultural diversity among participants, which will facilitate an exchange of unique plant varieties and of sustainable farming practices. Taken together, we hope

to bring WMU to the forefront of local and sustainable campus-based food production.

Amount Requested: \$4,973.83 Amount Allocated: \$4,973.83

2. Redesigned Hydraulic Bicycle For The Chainless Challenge

Principal Investigators: Luis Morales and Juan Hernandez.

Faculty/Staff Advisor: Jorge Rodrigues, Ph.D., MBA. Advisor

Department/Program: Industrial and Manufacturing Engineering

Abstract: One aspect that is extremely important in sustainability all over the world is transportation. Developed societies have come to depend on transportation to have economic and social standards, but without the proper attention to the environment.

A Hydraulic bicycle is a chainless bicycle that transfers power to the pedals by means of a liquid passing through tubes from hydraulic pump to hydraulic motor and back.

Due to demand for energy efficiency and environmentally friendly transportation, we are seeking to improve the hydraulic and drive train design for increased energy utilization and regeneration. Also to validate the efficiency in simulated competition conditions and for the first time, to design and fabricate the frame of the bike, due to previous issues, such a spacing for valves, pedals, hoses, etc.

The goal of this invention is to provide a drive mechanism that could be much more efficient. All mechanical elements of this drive mechanism that require lubrication are fully enclosed and thus eliminate all the well known disadvantages of current drive chains; namely, exposed grease lubricated chains with the potential of staining and jamming cloths, low driving efficiency and high maintenance requirements. Added advantages are, a considerably improved driving efficiency,

simplifies drive wheel change out, a simpler frame design and zero maintenance on any drive component. In addition to the efficiency gain the mechanical drive components, is confirmed that the drive ergonomics of this new drive could be better than a conventional bicycle crank drive. There is no penalty, when compared to a convention bicycle crank drive.

The proposed project complements the design and fabrication of the transportation vehicle; it develops an implementation plan to use such vehicles in WMU campus. These can be considered as a wonderful initial step towards having a campus wide culture in terms of alternative non-motorized vehicles.

Amount Requested: \$4,750 Amount Allocated: \$4,750

3. Assessment and management plan for the dwarf hackberry, savanna remnant and urban forest at Western Michigan University

Principal Investigators: Dean Simionescu, Bruce Howe.

Faculty/Staff Advisor: Steve Keto, Natural Areas and Preserves Manager

Abstract: Recently a dwarf hackberry (*Celtis tenuifolia*) was discovered growing on a sandy hillside located on Western Michigan University (WMU) property next to the Stadium Drive apartment complex. The ecosystem where this uncommon tree species is growing is reminiscent to a pre-settlement savanna, now nearly absent to the Kalamazoo area. A study done by WMU researchers based on old U.S. Public Land Survey information were able to create a map showing vegetation in Kalamazoo county during the 1820's. The new data shows that this spot lies at the convergence of what was believed to be an oak savanna and burr oak opening before settlers began to transform the landscape

(Appendix A). This urban green space has sandy soil and maintains a mix of dense forest, woodland and open savanna area. Since the discovery in 2010 of *C. Tenuifolia* by Dr. Todd Barkman, more individuals have been identified on the land. This tree species has been recorded in Michigan only 30 times (populations and individuals) in 6 different counties since 1974 and makes this finding the first in Kalamazoo County to be recorded (MNF). In Michigan *C. Tenuifolia* is classified under special concern status and is considered 'rare or uncertain' yet is not legally protected. The land sits on the lower slopes of the remnants of the Kalamazoo Psychiatric Hospital, holding historic value but also acts as an important area for the natural storm water drainage. This urban green space is an important aspect to students living in the Stadium Drive apartments, the community garden and the overall aesthetic appeal that WMU provides to its students and its community. A tree inventory was done with a GPS unit and a point data collection with a new mobile application by Avenza (Figure 6). The data will be evaluated with spatial-temporal analysis GIS techniques. This report will highlight *C. Tenuifolia* and the ecology of the savanna remnant, draw out the interconnectedness of this property with the University as a whole, and layout a management plan to preserve and improve the land in accordance with the WMU Tree Care Plan and Policy standards (Appendix G).

Amount Requested: \$4,212.57 Amount Allocated: \$4,212.57

4.Reducing Western Michigan University's Carbon Footprint

Principal Investigators: Christopher A. Roth.

Faculty/Staff Advisor: Duane Hampton, Geosciences.

Abstract: Greenhouse gasses, when in our atmosphere, trap heat and increase global temperatures. Over 50% of these greenhouse gas

emissions are in the form of CO₂ and generally come from coal or gas-fired power plants and vehicular traffic. With the EPA edging toward new taxes on power plants that dump greenhouse gasses into the atmosphere, and considering that Western Michigan University (WMU) generates all of its power by burning gas, it is financially as well as environmentally important for WMU to find a way to limit its carbon footprint. Carbon sequestration is an upcoming technology that could be used to reduce CO₂ emissions created by the deep saline aquifer that has been proven reliable in the storage of waste materials. This project will focus on the creation of a steady state CO₂ sequestration model that can be used to estimate the storage efficiency of the Mt. Simon Aquifer. Money from this grant will be used for the applicant to receive proper training in creating this model using GEM. Upon completion of this research, WMU will have a valid estimate of the sequestration efficiency of the underlying aquifer. In addition to environmental benefits, as EPA standards become stricter, it is important that the university is prepared to limit and reduce its carbon footprint before it becomes a taxable issue.

Amount Requested: \$1,450 Amount Allocated: \$0

5. Rain Water Collection Feasibility Study

Principal Investigators: Kyle Simpson.

Faculty/Staff Advisor: not identified

Abstract: this Student Sustainability Grant will evaluate the potential for implementing rainwater collection systems across Western Michigan University property. Areas included in the study will be: Main Campus, Oakland Campus, Parkview Campus, Student Housing, The Office for Sustainability, and the Gibbs House. The methods will include in-depth research into existing and prior art, implementation of similar programs and structures in the United States and abroad, potential filtration and sterilization techniques, potential legal considerations,

and cost evaluations for future implementation to the specific areas mentioned prior. This feasibility study will be concluded with a technical paper, reviewing aforementioned methods and conclusions, and a PowerPoint presentation of the study's results to any interested parties. This study will not yield any physical structures by the time of completion, but will instead serve as a fundamental base for future considerations in this area of research while educating the local community. Rainwater collection is abundant throughout many parts of the world, and for many it is the only source of portable water. WMU currently pipes in all the water the campus uses via the city mains, which comes with both a monetary cost and a cost to the environment. Kalamazoo water has a well-deserved reputation for being un-ideal, due to the slew of contaminants that are detrimental to local human, animal, and environmental life. Rainwater often contains less contaminant than piped city water, although is still prone to problems of its own. This feasibility study for a rainwater collection program and necessary structures at WMU offers a more self-reliant, self-sustainable, and a potentially healthier and more cost-effective solution.

Amount Requested: \$0 Amount Allocated: \$0

Spring 2013 Student Sustainability Grant Proposals

Total funds requested: \$35,050.70

Total funds allocated: \$35,050.70

1. WMU Plant Policy Initiative

Principal Investigators: Karma Hassell and John-Luke D'Ambrosio.

Faculty/Staff Advisor: Scott Smith, Assistant Professor, Geography.

Abstract: The advancement of sustainability on the campus of Western Michigan University is an effort that benefits all members of the University community. New sustainable projects and initiatives are prevalent and can be seen at this level in many capacities. This proposal

provides an outline of a sustainable design project that will result in an increase in the biophilic elements seen on campus. Increasing the amount of plants within indoor environments has sustainable benefits that are realized in many ways. Associated research shows that plants-filled buildings contain a substantially less amount of air-borne mold and bacteria. Research has also shown positive benefits as to plants' abilities to purify the air of indoor pollutants such as CO₂ and Benzene. This proposal outlines the installation of indoor plants inside a small area of Wood Hall. The current absence of any such plant installation in Wood Hall makes this project a well-suited fit for such proposal. Using wall mounted plants as well as a Balconera (box) planters, this simple initiative will establish a presence of "greenness" in Wood Hall that is currently absent and will benefit all who work and study there. Aside from the environmental and health aspects of such green installations, this project will substantially increase the aesthetics associated with Wood Hall. Though this aspect of the proposal it is the hope of the authors that this project will provide for an increased awareness of sustainability on campus through exposure and knowledge of such sustainable projects.

Amount Requested: \$4,375.70 Amount Allocated: \$4,375.70

2. High Efficiency Low-Flow Showerheads

Principal Investigators: Daniel Nowak and Mayra Yat Aguilar.

Faculty/Staff Advisor: Scott Smith, Assistant Professor, Geography.

Abstract: Water consumption in the United States is among the highest around the world. Americans use roughly 43 billion gallons of fresh water everyday. Western Michigan University is no exception to this trend. Looking for new ways to reduce our carbon footprint is what WMU is all about. This proposed pilot project aims to do just that. By renewing the showerheads of Britton and Hadley Halls in the fall of 2013 with low flow showerheads, we plan to show that with little cost to the university we can make a substantial difference in our move towards the goal of WMU's 5-year comprehensive master plan for year 2014-2018. With the implementation of the pilot project, we expect to

save 2,592,000 gallons of water annually with just 150 low flow showerheads with an output of 1.5 gallons per minute (GPM) as opposed to the current showerheads that average 3.0 GPM. With the highest density living situations for on campus living, this pilot project would cost roughly \$3,800, an extremely sound investment as it would be able to pay itself back within a year based on energy savings, reduction in carbon emissions and water consumptions.

Amount Requested: \$3,800.00 Amount Allocated: \$3,800.00

3. Apiculture Training Installment for Continued Horticultural Research

Principal Investigators: Nicholas Wikar and Weston Hillier.

Faculty/Staff Advisor: Dr. Lawrence John Connor, Founder of Wicwas Press.

Abstract: With our proposal we are trying to setup an apiary horticulture research installment on Western Michigan University's property. The proposal was authored by the members of SSE as a collaboration with the Office for Sustainability, Biological Sciences Department, Landscaping Services, and the Environmental Studies Department. Through this research, we aim to build upon the Office's existing garden space and future goal of a permaculture system. Bees play a vital role in many biological systems, specifically as pollinators. We are very pleased to have the opportunity to work alongside our advisor, Dr. Lawrence Connor, who is a world-renowned entomologist, author, and publisher. With a Bachelors of Science, Masters of Science, and a PH.D from Michigan State in Entomology, Dr. Connor will help foster a working relationship between the student researchers and the Biological Sciences and Environmental Studies Department of Western Michigan University. Our aim will be to integrate this research installment into the future curricula, with special events open to both undergraduate and graduate students, as well as the community. Though the employment of train-the-trainer educational techniques, it is our hope that this project will be a long-term opportunity, for

individuals to share the materials and rotate throughout the years to ensure increased apiculture literacy. These educational opportunities will include direct beehive maintenance, microscopic lab analysis of bee anatomy, and the exploration of the potential benefits of harvestable resources such as honey and proposes form the hives.

Amount Requested: \$11,065.00 Amount Allocated: \$11,065.00

4. "I AM WMU" T-Shirt Swap

Principal Investigators: Nicole Davenport and Christine Davenport.
Faculty/Staff Advisor: Chris Sligh, Director of Student Activities and Leadership Programs.

Abstract: Each year, Western Michigan University students are provided with the opportunity to receive t-shirts that proudly promote the university's organizations and campus programming. These basic t-shirts being disbursed do not adequately represent WMU's sustainability initiatives. We propose for the Western Student Association (WSA), the student body representation, to initiate the change to a more eco-friendly t-shirt being provided by Western's campus. This will be done on April 17, 2013, where WSA's Student Pride Committee will facilitate a "T-Shirt Swap." On this day, any student will have the opportunity to exchange either apparel from another university or make a documented pledge to be more sustainable for an eco-friendly long-sleeve "I AM WMU" t-shirt. This exchange will serve as an example for Western Michigan University that students are acknowledging that basic t-shirts are not sustainable for the long-term mission of this University and initiate the discussion for eco-friendly t-shirts a normal requirement for this campus.

Amount Requested: \$1,535.00 Amount Allocated: \$1,535.00

5. Office for Sustainability Green Wall

Principal Investigators: Elise Crafts and Curtis Aardema.

Faculty/Staff Advisor: Scott Smith, Assistant Professor, Geography.

Abstract: This proposal details the design and implementation of a

green wall on the western exterior of the Office for Sustainability building. A green wall in this location will have many benefits, including: reduced air, noise, and water pollution; reduced heating and cooling costs for the OfS building; and increased educational opportunities for all WMU and non-WMU peoples who utilize the Howard Street and West Michigan Avenue corridors and associated public realm. Using a recycled trellis provided by WMU Landscape Services or other material, the design will incorporate rainwater harvesting adjacent to the wall. The project planting materials will be determined upon collaboration with the Department of Biology and Environmental Studies to offer educational opportunities as well as native species plant selection. Additionally, the Department of Fine Arts will be consulted for final project design that is both accessible and informative to a diverse population. Landscape services will provide ongoing maintenance including watering, pruning, and general repair as needed.

Amount Requested: \$9,750.00 Amount Allocated: \$9,750.00

6. The Forum [Amphitheater] Design Initiative

Principal Investigators: Anthony Haduch and Brandy Morgan.

Faculty/Staff Advisor: Chris Sligh, Director of Student Activities and Leadership Programs.

Abstract: The Forum [Amphitheater] Design Initiative is a special project driven entirely through student efforts. Working with administrators of Western Michigan University to repurpose the amphitheater space, located in the center of Dunbar, Knauss, and Friedman Hall. Currently, this area has no defined use. We as a student body are working toward further defining its purpose as a location for outdoor events to be held. The purpose of this grant request is to obtain funding to fully implement “stage one” of the cosmetic renovation to the amphitheater event space.

“Stage one” of this cosmetic renovation will consist of a WMU student designed mural, brown and gold tapestry, and assorted vegetation to bring life to the space. Since this venue is meant to be a point of pride

for our university, student(s) from our art program will facilitate the design of the mural. This stage of implementation will use the artistic theme of “Western Values”. These artistically represented values will embody what it means to be a student here at Western Michigan University: academics, student involvement, diversity, university pride and, of course, sustainability. There will be a professional consultant provided by facilities management to monitor the realistic approach toward the completion of the mural.

Due to the timing of this grant application, we are unable to request funding for the supplies to design the mural. Instead, we are asking that the sustainability grant specifically fund the essential finishing touches to enhance the space. These items are those listed as assorted plant life, including our University Flower the Brown-Eyed Susan, as well as, WMU themed tapestry that will overhang across the top of the amphitheater. If this budget is approved, we will be sure to purchase the most sustainable and durable fabric for the use of this design. Facilities Management has the resources to sort through vendors that will fit the mission of this sustainability initiative.

Amount Requested: \$4,525.00 Amount Allocated: \$4,525.00

Fall 2012 Student Sustainability Grant

Proposals Total funds requested: \$13,269.00

Total funds allocated: \$13,269.00

1. Aquaponics / Black Soldier Fly Larvae / Vermicomposting

Principal Investigators: Brian Balconi and Tyler Shelton

Faculty/Staff Advisor: Jorge Rodriguez, Associate Professor, Industrial and Manufacturing Engineering.

Abstract: Aquaponics is a food production system that combines hydroponics—growing plants without soil, and aquaculture—fish farming. Fish wastewater is utilized as a nutrient source for plants grown in media, and plant filtered water is then cycled back to the fish.

Specifically, bacteria convert fish effluent ammonia into nitrogen that is plant soluble as nutrients. Aquaponics is a developing technology, gaining momentum in food production without the use of synthetic chemicals. We intend to expand upon aquaponics by incorporating vermiculture and black soldier fly larvae. Pre-consumer organic food waste can be directly fed to worms in vermicomposting. Vermicomposting converts this food waste into nutrient-rich castings. Castings can be applied to a garden or used as media for rooting our aquaponics plants. A portion of the worms will be used as fish feed in the aquaponics system. Black soldier fly larvae will consume lipids and fats that the worms cannot. The larvae will produce a black residue that is very palatable for the worms. The worms then further convert the residue into worm casts, while larvae/fly protein will be used as fish feed. Currently the Office for Sustainability is transitioning into a permaculture approach of food production. In permaculture systems thinking is highly valued. The incorporation of the systems above will allow for research into comprehensive waste management. This system will also allow us to research an alternative to energy and pollution intensive industrial agriculture, which is a major contributor to current global climate change.

Amount Requested: \$4,999.00 Amount Allocated: \$4,999.00

2. Alternative Energy Vehicles, Make it Fun!

Principal Investigator: Baxter Gill

Faculty/Staff Advisor: Jorge Rodriguez, Associate Professor, Industrial and Manufacturing Engineering.

Abstract: Transportation is a topic of extreme importance in sustainability efforts all over the world. Society has come to depend on transportation in order to have economic and social standards, but its dependence on fossil fuels is the largest negative effect on the environment. Fortunately there have been strong efforts in the area of alternative energies, like electric and solar vehicles, and in the area of energy storage, like flywheels. We are proposing the design, fabrication and benchmarking of vehicles (go-karts) that use these technologies. One vehicle will have the capability to operate with electric and/or

solar energy, and the second one with a standard gas- engine, but with a modification to include the flywheel concept. Two goals are pursued with this project, that these vehicles will be used to i) benchmark performances under different conditions, and II) showcase during student events to raise awareness about sustainability and alternative energies, in a fun way. Every young person is attracted to driving and competition, and these unique vehicles will be great educational tools because students will have the opportunity to experiment with them in future projects, and at the same time they will be great engaging devices that will capture young minds and will put that seed about sustainability and alternative energies in their brains. The group of students proposing this project have been involved with the SAE Baja and Formula competitions, and firmly believe that the impact that these vehicles will have in the College and WMU will eventually be reflected in the global environment because they have learned about green transportation while having fun.

Amount Requested: \$3,495.00 Amount Allocated: \$3,495.00

3. Urban Transportation Tricycle Prototype Using a Sustainable Open Source Design

Principal Investigators: Adam Hill and Michael Robinson

Faculty/Staff Advisor: David Middleton, Senior Instructor, Industrial and Manufacturing Engineering.

Abstract: Bicycling is an incredibly efficient means of transportation. When cycling at relatively fast speeds, it is the most efficient form of transportation, more efficient than an automobile or even walking (Exploratorium, 2012). Thus, experimenting, improving, and cultivating awareness of different cycling options is a great method of increasing our level of sustainability on campus and in the community. We propose to build an urban transportation tricycle in order to provide alternative options of transportation to students while exploring different technologies that can assist these methods of transportation. Our design team will build a recumbent tricycle frame using raw

materials and materials from other bicycles; it will be lightweight, have room for storage, and be usable in adverse weather conditions. This prototype will serve as a platform to which other technologies can be added to improve functioning and to explore alternative transportation options. Our electrical engineering team will be outfitting the bike with the first of these technology options – an electric hub motor system and a hydrogen fuel cell to provide the vehicle with clean power to assist the rider and extend the range of its use. When finished, the plans will be made available for free as an open-source to any student or community member who wishes to construct a similar vehicle. *Somewhat* similar vehicles are available on the market to day but are impractical due to their high cost or weight. Ideally our tricycle could be made for comparatively little money, thus becoming an affordable option for a student to build and use for daily commuting.
Amount Requested: \$4,775.00 Amount Allocated: \$4,775.00

Spring 2012 Student Sustainability Grant

Proposals Total funds requested: \$11,648.59

Total funds allocated: \$10,928.00

1. Prototype of a Hybrid Solar Updraft Tower

Principal Investigators: Josef Imesch and Adam Haslinger

Faculty/Staff Advisor: Jorge Rodriguez, Associate Professor, Industrial and Manufacturing Engineering.

Abstract: This project involves the design and fabrication of a prototype Hybrid Solar Updraft Tower (HSUT). This tower uses the sun's light to create energy through the use of a greenhouse, chimney, and turbine. The sun shines onto the greenhouse, heating the air within. Concentration techniques will be utilized (Hybrid) by having lenses mounted on top of the greenhouse to focus light onto mirrors. These mirrors will then redirect the light onto the tower, where hot air will rise and drive turbines to create electricity. Solar updraft towers have been tried before, with mixed results, but none of them utilized lenses

and mirrors. This new design will be more efficient and, hopefully, competitive with other forms of green energy. Green energy is growing more important every day as power plants spew more and more pollution into our atmosphere. This tower is another step toward understanding the capabilities of a full size HSUT, and will be used as a proof-of-concept. We currently have solar panels and a wind turbine on campus. The addition of a prototype HSUT would show a stronger commitment to becoming a more sustainable campus. To the best of our knowledge, we would be the only campus with a prototype of such a tower. This would set us apart from other universities. This prototype would be used to encourage current students to become involved in similar projects. It would also be used as a showpiece to get perspective students more interested in coming to WMU.

Amount Requested: \$2,925.00 Amount Allocated: \$2,925.00

2. Botany Club

Principle Investigators: Weston Hillier

Advisor: --

Abstract: Botany Club is based around giving the WMU population a chance to learn and grow plants in a student led discussion about how and what to do. Using the money given to the RSO the goal will be to help start and situate the club in its finances; giving the right environment and supplies necessary to thrive.

Amount Requested: \$720.55 Amount Allocated: \$0.00

3. New Student Orientation: Strides Toward Becoming Sustainable

Principal Investigators: Anthony Haduch and Brian Donahue.

Faculty/Staff Advisor: Steve Booher, Orientation Coordinator, First-Year Experience.

Abstract: The First-Year Experience Program is moving toward making changes within its programs to become more sustainable. Our programs interact with all incoming first year students and their families. With these interactions we are able to provide a proper first

impression that students can anticipate while attending Western Michigan University. As an office, we are adapting our programs to utilize more sustainable practices. Through this proposal an explication of shifting from plastic ponchos to durable and reusable umbrellas will be made. A discussion of how this will enhance the environment of Western Michigan University, as well as how our department plans to express the importance of the sustainability efforts at both our programs and the University are progressing toward.

Amount Requested: \$3,125.00 Amount Allocated: \$3,125.00 NOTE: Although this abstract reads as though the proposal came from a WMU department, it was authored by an undergraduate student and supported by a graduate student in keeping with SSG funding guidelines.

4. Carbon Neutral USB-Drives – RSO Financial

Principal Investigators: Izaak Blankenstijn and Meredith Atchison.

Faculty/Staff Advisor: Kate Bates, Assistant Director, Student Activities & Leadership Programs.

Abstract: The RSO Financial Workshop has been conducted for many years for students and RSOs that apply for SSG, WSA-AC, GFAC, and SCC funds. Each academic year, RSOs and other grant receivers are required to attend this workshop. Traditionally, during these workshops mandatory reading materials have been handed out in paper format of approximately 36-40 pages. With funding from the SSG, students that attend these workshops will receive these reading materials, payment forms, sample forms, sample contracts, presentation, RSO Handbook, etc., in electronic format via a Carbon Neutral USB-Drive made partially from hardwood from a FSC certified source. This potentially reduces the amount of ink, electricity, and paper for this project by over 15,200 pages per academic year, thus further increasing the sustainability of the University and its undergraduate and graduate students. The USB-Drives will bear a logo or other acknowledgement indicating that this project was funded by the SSG-AC, hence promoting and bringing awareness to the culture of sustainability at WMU.

Amount Requested: \$4,878.00 Amount Allocated: \$4,878.00

Fall 2011 Student Sustainability Grant

Proposals Total funds requested: \$45,830.00

Total funds allocated: **\$31,803.00**

1. Prototype of a Dual-Purpose Assisted HP

Transportation Vehicle for Campus

Principal Investigators: Kevin W. Peabody, Shane Ambler, Ryan Mass, and Bill Burd.

Faculty/Staff Advisor: Jorge Rodriguez, Associate Professor, Industrial and Manufacturing Engineering.

Abstract: Sustainability has become one of the biggest issues in the last decade. A specific aspect of extreme importance in sustainability is transportation. Developed societies are highly dependent on transportation for economic and social standards, but without attention to the environment. We are proposing the design and fabrication of a prototype of a dual-purpose assisted human powered transportation vehicle for campus use. It will be a prototype, since it will be a single unit that will serve as a proof-of-concept, it is dual-purpose because the goal auxiliary power capabilities to fulfill requirements, and it is a vehicle, which implies at this point that it will be “something that moves”, the alternatives (ie., 2-, 3-, or 4-wheel vehicles) will be evaluated, and the final vehicle will fulfill safety and road regulations. The proposal considers as well developing an implementation plan to use such vehicles on campus.

The plan for the design will follow a standard engineering design process, and the budget covers mainly materials and components. This proposal can be considered as a wonderful initial step towards having a campus wide initiative in terms of vehicles, and an additional step that supports existing initiatives on campus (e.g., borrow a bike) or in the community (e.g., bike paths). The benefits for sustainability on campus are great, by showing fun, healthy options, it is expected that more

people will be involved and eventually the campus culture will change. We just need support to get the ball rolling.

Amount Requested: \$2,700.00 Amount Allocated: \$2,700.00

2. Vermicomposting: Reducing Waste and Promoting Sustainability

Principal Investigators: Dean Simionescu and John W. Lee

Faculty/Staff Advisor: Matthew Hollander, Coordinator of Sustainability Projects, Office for Sustainability.

Abstract: Vermicomposting is a method of converting organic waste into a natural fertilizer using microbes and earthworms. This method of waste conversion has gained popularity across the globe for its ecological and economical benefits. As food waste is consumed, worms produce excrement, called castings, which are further broken down by microbes. These castings provide nutrients for plants to grow larger and yields more produce and can even help deter pests and insects (Perumalsamy). The castings are often turned into a compost tea, which can then be sprayed for easy application. There is already ongoing research on campus for compost tea using a 150-gallon brewer located at the Gibbs house. The compost tea produced will be used by the Student Garden Organization (SGO) and will allow us to explore the potential for business and municipal integration. Establishing a small-scale vermicompost facility on campus will allow students to learn the processes that comprise decomposition, allow for experiments to further explore and expand the limits of vermicompost capabilities while producing a super nutrient-rich fertilizer.

Amount Requested: \$3,868.00 Amount Allocated: \$3,868.00

3. Used Bike Rental Program

Principal Investigators: Brian Oswald and Zach Waas Smith

Faculty/Staff Advisor: John Schmitt, Business Consultant, Haworth College of Business

Abstract: In order for WMU to increase its sustainability, it must

reduce its carbon dioxide emissions, one third of which come from transporting alone (Bessey, Braman, Davis, 2010). While the university is making great strides toward reducing carbon emissions, more must be done in the way of transportation reorganization if WMU hopes to become a leader in sustainability. Cycling is not only a sustainable mode of transportation, but it promotes positive health and physical condition of riders, improves air quality, requires very little infrastructure (compared to cars), and contributes to social inclusion (Grabrow and others, 2011; Engbers, Hendriksen, 2010). STEED, a registered student organization (RSO) at WMU, focuses on the advocacy of Non-motorized transportation (NMT) through education and empowerment. The Bike Stable, who works directly with STEED offers in-shop services such as maintenance, repair education, and tool accessibility. The Bike Stable has already made a headway toward a bicycle rental program in OCTOBER of 2011 The Bike Stable worked with WMU Public Safety to select 8 bikes from Public Safety's collection of abandon bikes which are now bound for eventual rental. However, the components on the bicycles have become very weathered and rusted. While The Bike Stable will work to reuse and salvage any usable parts on the bikes, many of the components will require replacement to ensure safe operation of the bikes. The goal of this project is to work with The Bike Stable to provide a bicycle rental program to expand services beyond the physical confines of our on-campus shop. Amount Requested: \$4,996.69 Amount Allocated: \$5,096.69 (SSG-AC allocated \$100 additional funding for program promotion)

4. Increasing Recycling: Prompts & Response Effort

Principal Investigators: Kathryn Kestner, Elian Aljadef-Abergel, and Yannick Schenk.

Faculty/Staff Advisor: Stephanie Peterson, Associate Professor, Psychology.

Abstract: The purpose of this study is to the effectiveness of two interventions for increasing appropriate recycling and trash sorting in Wood Hall. The first intervention will use visual prompts/cues

appearing or the existing recycling and trash stations in the hallways on the first and second floors of Wood Hall. These prompts will include more detailed waste-sorting information in order to increase appropriate recycling and decrease in errors. The second intervention will be the addition of lids on top of existing classroom trashcans to increase the effort of throwing material into classroom trashcans to encourage individuals to instead choose the less effortful response of using the open recycling/trash centers in the hallway. An additional prompt will appear on the classroom trashcans to; indicate the recyclable materials should be disposed of in the appropriate cans in the hallway. There are no recycling receptacles in the classrooms; individuals using the centers in the hallway will come into contact with the opportunity to recycle. Our hypothesis is that providing detailed waste sorting information in the hallway receptacles will increase appropriate sorting while reducing errors. We hypothesize that the additional component of increasing the response effort involved in the use of the classroom's trashcans will further increase appropriate recycling and waste disposal.

Amount Requested: \$858.40 Amount Allocated: \$858.40

5. Earth Hour 2012

Principle Investigators:

Faculty/Staff Advisor:

Abstract: Earth Hour has become a global movement that raises the awareness of sustainability in a monumental fashion; there is no other event worldwide that brings so many people together to support sustainability (currently 1.8 billion). While they might not physically be together, we are united as one for this one time a year where people all over the world are fighting for the same cause, sustainability.

Surprisingly the city we think has proven time and time again to be a frontrunner in modernization and innovation has let this spring event slip through their fingers, but it's time that Earth Hour and its followers inhabit Kalamazoo.

Earth Hour takes place on March 31, 2012 at 8:30. At this time the

lights go off, and I mean this literally. The goal of this event is to power down the ENTIRE city, that means cars, buses, businesses and anything else that uses energy. During this hour a festival is held to celebrate the generous act that is taking place, to come together as a community and of course to fill the void that our technology driven lives are missing without instant connectivity.

Amount Requested: \$9,990 Amount Allocated: \$0.00

6. RSO Financial Workshop USB-Drives

Principle Investigators:

Faculty/Staff Advisor:

Abstract: The RSO Financial Workshop has been conducted for many years for students and RSOs that apply for SSG, WSA-AC, GFAC, and SCC funds. Each academic year, RSOs and other grant receivers are required to attend this workshop. Traditionally, during these workshops mandatory reading materials have been handed out in paper format of approximately 36-40 pages. With funding from the SSG, students that attend these workshops will receive these reading materials in electronic format via USB- Drive. This potentially reduced the amount of paper for this project by 15,200 pages over academic year, thus further increasing the sustainability of the University and its undergraduate and graduate students.

Amount Requested: \$4,137.00 Amount Allocated: \$0.00

7. 2011 Student Garden Organization Grant Proposal

Principal Investigators: William H. Derouin and Kevin Martini

Faculty/Staff Advisor: Matthew Hollander, Coordinator of Sustainability Projects, Office for Sustainability

Abstract: As Western Michigan University's Student Garden Organization (SGO), our proposal represents the continuation and expansion of currently existing sustainability projects associated with Western Michigan University's gardens at the Gibb House and on Stadium Drive. We seek to create opportunities for students and

Kalamazoo-area residents to become better educated about sustainable options for food production through direct, active learning experiences. At the same time, we will be developing and maintaining gardens capable of supplying WMU catering services with sustainably grown produce, with year-round provision of herbs made possible through collaboration with the Finch greenhouse. Additionally, we seek to create a conservation area to protect native Michigan biodiversity, while providing a relaxing and inviting atmosphere, conducive to community outreach programs, including educational events and activities. Ultimately, our goals are to increase overall sustainability at WMU and expanded outreach to a larger segment of WMU's student population.

Amount Requested: \$9,992.00 Amount Allocated: \$9,992.00

8. The Campus Beet's Weekly Meal

Principal Investigators: Brian Balconi and Michelle Tomasko

Faculty/Staff Advisor: Matthew Hollander, Coordinator of Sustainability Projects, Office for Sustainability

Abstract: The Campus Beet is an initiative to begin a student-led café on Western Michigan University's campus. The Campus Beet will focus on providing sustainable, healthy food choices and providing menu items that cater to special dietary needs. The Campus Beet will attain these goals through sourcing food from local and/or organic vendors, planning menus that reflect the seasonality of produce on the region, collaborating with on-campus farming initiatives to source items. Menu items will cater to gluten and/or dairy-intolerances, as well as gain and demonstrate competence in regularly preparing and serving food from a licensed kitchen.

Amount Requested: \$9,288.78 Amount Allocated: \$9,288.78

Spring 2011 Student Sustainability Grant

Proposals Total funds requested: \$22,308.58

Total funds allocated: \$19,384.58

1. Evaluation of University Residence Halls on Utilities

Principle Investigators:

Faculty/Staff Advisor:

Abstract: The price of utilities continues to climb throughout the world, and it is no different for on-campus residents of Western Michigan University. With costs constantly rising, universities are being forced to raise the price of student housing to match the demands of growing energy costs. However, I believe we can curve the demand in cost increases by giving money back to nearly 5,000 students who choose to live in in university residence halls annually. If these 5,000 students are contributing \$8 per semester, they are contributing \$80,000 annually towards the Sustainability Fund. Some of this money should be allocated for the sustainable improvement of residence halls. This research would look for ways to efficiently decrease the amount of energy consumed by on-campus residents through alternative energy resources, such as wind turbines, high efficiency light bulbs, solar panels, or other more sustainable methods. The research will include the cost to implement suggested improvements, estimated amount of money the community would save on utilities, and student response to suggested improvements.

Amount Requested: \$2,834.00 Amount Allocated: \$0.00

2. Campus Bicycle Cooperative

Principal Investigators: Zachary Waas Smith and Jacob Huizenga.

Faculty/Staff Advisor: Harold Glasser, Executive Director, Office for Sustainability.

Abstract: Over a third of Western Michigan University's total greenhouse gas emissions are the result of gasoline- powered transportation. In order to lessen the impact of transportation carbon emissions and improve WMU sustainability, WMU needs to invest in alternative transportation options. A campus bicycle cooperative is one

of these options and is an essential step toward advancing campus bicycle infrastructure. This project will be the first effort to establish a bicycle cooperative at WMU, but not the first at any university; there are several very successful campus bike co-ops in existence across the continent whose efforts have contributed to the structural development of this co-op. This co-op will focus on bicycle maintenance, repair, education, accessibility, and promoting the bicycle as a mode of transportation. Money from this grant will support the purchase of necessary tools, promotional efforts, and operational structure (computers, staff, signage, office materials, etc.). Students will work collaboratively to operate the campus bike co-op, and this grant will augment their success. This grant will improve WMU sustainability through the amelioration of infrastructure for alternative transportation options available to WMU faculty, staff, and students. Amount Requested: \$9388.00 Amount Allocated: \$9388.00

2. Free Store/Share Space Infrastructure

Principal Investigators:

Faculty/Staff Advisor:

Abstract: Over the past three years, I have been trying to formulate an alternative consumer community as well as utilize the creative and thrifty population of students on WMU's campus. This project of a Free Store/Share Space would mean that there would be a permanent location for these items and ideas to thrive and be exchanged. In order to do that, I need a minimal amount of infrastructure for organization and aesthetics. Tentatively, this space will be in a few Offices in the basement of Faunce; two rooms for display, and one room for storage and organization. All of these rooms will need shelving units, clothing racks, and hangers.

Amount Requested: \$540.00 Amount Allocated: \$540.00

(conditional) NOTE: The proposal author failed to meet the SSG-AC's allocation conditions. Funds were not disbursed.

4. The Campus Beet Open House

Principal Investigators: Amelia Stefanac & Caleb Oliver

Faculty/Staff Advisor: Matt Hollander

Abstract: The Campus Beet is a Registered Student Organization that is working towards building a student-led café. This initiative is in a response to a growing need for students to have a source for local and sustainable foods on campus that fit their dietary needs, as well as a need for a social, creative, and co-curricular outlet on Western's campus. We recently collaborated with dining services and dietetics interns to hold a menu-taste event that was well attended and thoroughly enjoyed. With the feedback on recipes from that event, we plan on making improvements through mini-tastes held on campus every other week. After working in the Bernhard kitchen for the menu test, we decided on pieces of equipment necessary to make this possible and ease the stress of production on such a mass scale. On April 8th, we will showcase the vision for this café through a finalized and perfected menu, along with musical guests poetry and fiction readings, film screenings, and visual art, all of which display the various talents of Western students. There will be a videographer to document, promote, and share our efforts throughout the University to further illustrate the success of this initiative.

Amount Requested: \$9,996.58

Amount Allocated: \$9,996.58