



Marsh W. White Award Proposal

Project Proposal Title	<i>Spring Into Physics!</i>
Name of School	Augustana College
SPS Chapter Number	0335
Total Amount Requested	\$410.46

Abstract

Augustana College's Physics and Engineering Society presents *Spring Into Physics!*, an annual outreach program built on basic physics and engineering concepts for students in the Quad Cities. Ultimately, our hands-on activities are designed to encourage students to think like scientists, spark their creativity, and get them excited about physics!

Proposal Statement

Overview of Proposed Project/Activity/Event

Similar to last year, we will be going to other schools to host this program. This year, we plan to do one long-term project at two different schools. This will be an after school program which will be open to students above 3rd grade in the school (with the exception of Bowlesburg, where we will open it up to 2nd grade). All sessions will have a physics concept as a theme, and these themes will contribute to the long-term project: rollercoasters for elementary students and Rube Goldberg machines for junior high students. Students will work in groups of 4-5; however, we want to keep the ratio of groups to volunteers as close as possible. Last year, we worked with Bowlesburg Elementary, and we hope to work with them again. This year, we are also looking at other schools, including Bicentennial Elementary, Longfellow Liberal Arts, George O'Barr Elementary, and Northeast Junior High School. We plan on hosting the program at two of these schools once a week for 4 weeks. We hope to incorporate more physics concepts into our curriculum this year as well as keeping the building, teamwork, and communication aspects of the program from last year.

The main goal of our project is to ignite a passion for physics and science in our students, as well as having them see the use of physics in everyday life. We plan to do this through the introduction of the engineering design process to teach our students how to think like engineers, placing students into the role of both engineers and students. We want to teach students concepts in addition to skills so they not only walk away knowing a little more about physics, but also with knowledge they can use in their everyday life. In every session, we want to be clear about the purpose of each project and concept. Students should always learn the why and how behind everything, and we want to emphasize that this year. We want students to have fun, and we want science to be perceived as enjoyable and accessible to everyone. We also have a goal of establishing partnerships with multiple schools so we can continue this program in the future.

Last year's audience consisted of 40 1st-2nd graders and 30 3rd-4th graders. This year, since our goal is to work with older students, we expect to have 40 students per school, totaling in 80 students for two schools. This year's focus is for students in 3rd grade and up. With the exception of Bowlesburg (which will be 2nd-4th grade), we want to cater to an older audience because they have more schema to work on more complex projects. We believe that this will ultimately impact more students and faculty, since we will be working with multiple schools. Even with a small fraction of the school's students attending our program, they will be able to spread the word of the program and show their friends and family what they learn from their projects, which will hopefully influence more students to be captivated and interested in physics.

We are motivated to continue this program from last year to make this into a reputable program that can be taught and implemented throughout many more of the Quad Cities schools. After testing out this program at Bowlesburg Elementary students this past year, our members have experienced how much of a difference we can make in the community by spending a few extra hours a week teaching physics and engineering to young students. This is important to us because students at this age can be positively impacted when paired with the right mentors, and our members can provide a positive influence combined with a passion for science through this program. Our feedback revealed that our students had a positive reaction to science after being exposed to our program, and our goal is to spark this interest in more students that do not have the opportunity to learn these concepts in school. There are many students who are in low income areas in the Quad Cities, and we want to make this accessible to them, to give them opportunities that they may not have due to their circumstances.

How Proposed Activity Promotes Interest in Physics

Our goals align with the Marsh W. White Award such that we want to continue to spark interest in physics among students in the Quad Cities area, and we hope for this interest to transform into a passion for this subject. Our project should be funded by this award because it will bring opportunities to students of low-income families who would not be able to experience this type of program if it were not provided by the school. Even so, students will learn basic curriculum in school, most of which do not consist of a specific physics or engineering lesson plan. By funding our request, we will be able to share our knowledge and outreach experience with local students to show them how interesting physics really is. This project will be worthwhile because students will be given the opportunity to delve into the world of physics early in their lives. Students who become passionate in physics at a young age will have more of a drive to make a difference in our world. They are also more likely to gravitate towards a

career in a STEM field, particularly physics. Since our club's budget is not built to support supplies for multiple schools in this program, we are requesting these funds so that our students will have ample supplies to work with for our planned projects

Plan for Carrying Out Proposed Project/Activity/Event

Our club executive board will be in charge of making sure this program runs smoothly and as planned. We will be led by our advisor, Dr. Cecilia Vogel, who will oversee our lesson plans and overall organization of activities. Our Physics Department Chair, Dr. Nathan Frank, will also be consulted for recommendations on projects and working with the students. Progress will be monitored by check-ins with each school's principal and staff members. In terms of promoting our program, our marketing chair, Shannon Rees, will be responsible for creating a poster with the *Spring Into Physics!* logo and President, Emmalee Pentek, will ensure that these are distributed to each school we partner with. We will use an "interest form" similar to last year's that asks if the student is interested in the program and can be picked up after school, which ensures that parents are available for transportation and that parent permission is given for the program. This will help us prepare supplies for how many students we believe will be involved in the program.

We expect between 10-15 SPS members to volunteer their time to this program. We have designed the program so volunteers can be present either Tuesday or Thursday and still be consistent with the school they volunteer at. One change that we would like to make from last year is including Augustana's education department in our program. This year, we want to make an effort to collaborate with them early on and include them in all of our planning meetings. These students will help us connect with our participants as well as keep them organized during the activities. This way, we can use multiple perspectives as educators and scientists to explain physics concepts during the project. We also will include the participant school's faculty who are available during this time. Using this approach will keep our groups organized, controlled, and with plenty of guidance. We will also accept help from other students on our campus who can be consistent volunteers and work with students to achieve our mission. Overall, all of these resources will help with working with the students, making sure they have enough supplies at all times, and having chaperones in the room as extra guidance.

Project/Activity/Event Timeline

We will begin by reaching out to schools in December as well as asking necessary departments for volunteers. We decided that to take action early on in this process is better than later so that we can gauge the interest of schools in the area and also understand what resources we have to work with. We will begin by reaching out to two schools and once we have their interest, we will schedule a time to meet with their principal in early January to explain our program. During this meeting, we will confirm that the school is willing to work with us, and we will set tentative dates for the program. Once we meet with each principal, the interest survey will be sent out to the students so we can determine how many supplies to buy to prepare for the projects. Depending on how our planning goes with the first two schools and the amount of volunteers we receive, we may incorporate another school into our program. The way we would infuse this into our schedule is by organizing another group of volunteers so that two schools are running the program on the same day. This way, we can bring our program to more schools and provide more opportunities to interact with students in the community. During the month of February, we will create and finalize our lesson plans. This will give us the opportunity to meet with our volunteers, provide them an idea of what each session will cover, and ultimately go over our plan of materials and how to work with the students. In February, we will also begin to buy supplies and conduct practice demos incorporated in our lesson plan. All supplies will be gathered and prepared by the first week of March. This will ensure that each group is equipped with the right materials before we set out to each school. Our college's spring break falls on the last two weeks of March so we plan to have everything set before we leave for break. Our tentative goal is to carry out this program during the whole month of April, depending on each school's spring break. Each week will be dedicated to a new physics concept; we will kick off the program with the engineering design process as the basis of our learning and each following week, we will introduce a new topic that will relate to the physics of their project and build on to their existing knowledge. The last week of the program will allow them the opportunity to show their complete projects their peers and faculty members. At the final session, we will provide each principal with surveys to be filled out by parents, staff, and faculty along with the surveys for the students. This will help us improve the program for the following year by understanding our strengths and weaknesses.

Activity Evaluation Plan

Last year, our chapter evaluated the success of our program by noting the attendance of students that participated as well as the enthusiasm of the students to create their own projects. We provided surveys for the participants, teachers, and parents to fill out so that we could receive feedback on our program and gain insight on what areas we excelled at or needed to improve on. For the students, we focused on the aspects of the projects they liked and how helpful our members were throughout the program. For the teachers and parents, we asked for thoughtful feedback on how we conducted the program, the level of satisfaction they believed their students had with our program, and their perspective on the instruction and difficulty of the activities. From the surveys, we were made aware of student engagement in activities, what we needed to do to accommodate their attention, and be able to help so that we can work with them better. This year, we want to incorporate a student feedback form that specifically asks what they would like to see from us in the future along with a rating scale to measure their satisfaction with specific parts of the program. Doing this will help us understand what worked for students and what did not.

Budget Justification

Roller Coasters: popsicle sticks, cardboard, plastic tubing, glue, tape, paper, plastic cups, marbles, markers, poster board (to put their projects on)

Rube Goldberg: cardboard, dominos, string, poster board (to put their projects on), plastic cups, paper towel/toilet paper tubes (can be collected), pop cans/water bottles (empty-can be collected)

Listed above are the essential supplies that we will need in order for the activity to be successful. We are requesting more money from the Marsh White grant this year because we will be preparing supplies for not just one, but two schools. We also expect a large number of students to still participate in the program since we will have three different grade levels included at each school. We are estimating that we will have approximately eight groups per school, which means that more materials are needed. We also want students to get creative with their projects and have a variety of materials to choose from while creating their structures. We will outline what materials will be completely essential to build each component of the project but essentially, each group will be encouraged to make a unique product by using the given materials in different ways. Overall, we feel that all of the materials in our budget proposal will contribute to the success of each group and will support our goal of helping them think like scientists. By using common materials, they will understand that physics is a part of everyday life and it will reveal that they can be scientists too by using creativity and concepts learned in the program to create a finished product they are proud of.

Another supply on our list is snacks. Parents noted on the feedback forms last year that it is a long day when their child goes to school and stays after for an extra activity. We understand this and we want to help the students stay engaged in our activities by providing an extra break for them. Since the school is providing the space for us to use for the program, we would like to be able to provide snacks for their students in return. We are reasoning that we can buy a bulk pack of fifty count snacks for $\$15 \times 4 \text{ sessions} \times 2 \text{ schools} = \120 . Any money that is unused will go towards any extra supplies we did not account for in our budget. Ultimately, we believe this will make parents more comfortable with leaving their child at school for a longer period of time.