



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	STOMP: Science Tutorials On Mechanics in Physics
Name of School	Tuskegee University
SPS Chapter Number	7446
Total Amount Requested	\$500.00

Abstract

Tuskegee University SPS will provide tutorials to high school students to increase exposure and interest in physics. Tutorials will be centered around the mechanics of a stomp rocket, making the experience engaging for all learners. Motivation for this project stems from the need to increase representation of minorities in physics.

Proposal Statement

Overview of Proposed Project/Activity/Event

The Tuskegee University chapter of SPS will be offering STOMP (Science Tutorials On Mechanics in Physics) to students at Booker T. Washington High School to expose them to the world of physics and solidify their knowledge of physics concepts. Volunteers will visit BTW during the spring semester for a total of six sessions to introduce students to concepts of classical mechanics. Lessons will model that of a collegiate Introduction to Physics course, covering length, time, mass, graphs, vectors, one dimensional motion, and Newton's Laws. Volunteers will use supplementary activities and materials to connect these concepts to real-life objects such as stomp rockets. The project will be concluded with a Launch Day where students can design, test, and modify their stomp rockets using the knowledge they gained from the lessons.

Booker T. Washington does not currently have any physics courses available for students to take during the school day. This outreach project will allow students to see what physics encompasses and encourage them to continue their exploration of physics on higher levels. With the college-gearred lessons, students will be able to master introductory physics concepts and will give them a sense of confidence when continuing their physics education personally or at the collegiate level.

We plan to host a classroom-sized group of students which will allow volunteers to provide one-on-one assistance to students and deliver lessons in a way that caters to all learning styles. The chapter has had experience with creating and delivering lessons to students through our outreach at Tuskegee Elementary School. While these demonstrations did spark curiosity in the elementary students, we feel as though extending this outreach project to high school students will have an even greater, longer-lasting impact. Exposing the high school students to physics could be the one driving force that compels them to select physics as a major and career path. Through STOMP, the chapter strives to help these students be confident in their ability to solve problems in physics and envision themselves as future physicists.

How Proposed Activity Promotes Interest in Physics

STOMP will meet the purpose of the Marsh W. White Award because it will be: 1) making available engaging lessons on physics that students had not had before, 2) encouraging students to go out on their own and investigate physics as it relates to them in the real world, and 3) since the lessons are modeled after a collegiate intro to physics course, students will feel more comfortable and confident when taking physics courses in the future. Ultimately, this leads to a cohort of students who will not doubt their ability to master the foundation of physics and are more likely to explore other, more advanced branches. Also, by implementing STOMP, the Tuskegee University Physics Department can build a rapport with the students at BTW. Students will feel empowered by their interactions with volunteers and physics department staff, hopefully creating a pipeline between the high school students and students choosing to enroll into the physics program at the University. Lastly, the volunteers' own interest in physics will be invigorated because they will be reinforcing their own knowledge of physics through teaching and providing mentorship the students.

Plan for Carrying Out Proposed Project/Activity/Event

- Personnel:
 - President, Taylor Jones, will be in charge of coordinating the lesson plans and supporting materials for each of the six sessions.
 - Vice President, Brandon Giuseppe, will be responsible for reviewing each lesson plan for organization and clarity of explanation & instruction.
 - Treasurer, Camryn Moore, will be responsible for proper monitoring and allocation of learning resources and Launch Day activity materials.
 - Secretary, Eugene Thompson, will administer a precursory survey and survey following the project's completion to assess effectiveness and areas for improvement.
- Marketing:
 - Teachers at Booker T. Washington will be notified via email of the program and the dates in which volunteers will be visiting, passing on the information to their students.
 - Flyers with project details/timeline will be posted for students, parents, and members of the community to view.
- SPS member participation:
 - 2-4 volunteers will attend each session in-person on a rotational basis. Social-distancing will be enforced.
 - TU SPS will be working with NSBE (National Society of Black Engineers) and SWE (Society of Women Engineers) to recruit volunteers.
 - All volunteers will be present on Launch Day to monitor student activity and give guidance and assistance with stomp rocket launches and modifications.
- Expertise:
 - President, Taylor Jones, is experienced with lesson-planning, module creation, and adapting to various learning styles through their participation in NSF-funded project iVR to Star: Integration of Virtual Reality (VR) to Support Technology-based Active-learning and Retention.
 - SPS faculty advisors, Dr. Walter Malone and Dr. Dimitar Dmitrov, will ensure project success by reviewing lesson plans for correctness and efficiency and providing feedback prior to implementation.

Project/Activity/Event Timeline

Project outline from completion to beginning stage:

May 2022	- Post-Project Survey - Stomp Rocket Launch Day
April 2022	- SESSION #5: Review & Stomp Rocket Construction - SESSION #4: Kinematic Equations & One-Dimensional Motion
March 2022	- SESSION #3: Position, Velocity, & Acceleration Graphs - SESSION #2: Scalar Vs. Vector Quantities
February 2022	- SESSION #1: Concepts of Length, Time, & Mass - Precursory Survey - Mock presentation by each group prior to implementation - Meet with volunteers to form teaching groups and review presentations
January 2022	- Order/Recieve learning resources and Launch Rocket Materials - Create powerpoint presentations for instruction (including problem-solving activity and additional helpful materials/resources for understanding) - Peer & Faculty Review - Create lesson plans

Activity Evaluation Plan

STOMP will have multiple measures to assess project success. Prior to lesson implementation, there will be lesson plans and presentations (reviewed by peers and physics faculty) to assist volunteers with instruction delivery. Participating students will be given supplies to maintain notes, handouts, and other materials that they're given. Also, a precursory survey and project completion survey will be given to students to gauge how knowledgable students have become of the covered physics concepts and to determine if their attitude towards physics has been positively impacted. Images and videos of project activities will be maintained via our chapter's social media.

Budget Justification

Standard school supplies will be bought to ensure that students' learning is not hindered by the lack of those items. Purchasing this supplies on the behalf of students will also ensure that they have the best materials suitable for visual and tactile learning.

Stomp Rockets and materials for testing and analysis will be used to show students how the physics concepts they've learned come to life.

