



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	TU-SPS-K-12 Outreach Demonstration Program on Renewable Energy
Name of School	Tuskegee University
SPS Chapter Number	7446
Total Amount Requested	\$300.00

Abstract

Tuskegee University Society for Physics Students chapter propose to conduct one to two days *K-12 education and outreach workshop* to demonstrate various renewable energy projects and explain Physics principles for sustainable development. This enrichment workshop will lead to create interest in STEM disciplines, particularly in Physics among K-12 school students.

Proposal Statement

Tuskegee University-SPS chapter will use the MWW award for conducting K-12 outreach workshops on renewable energy projects and explains their underlying Physics principles to create interest in STEM.

Overview of Proposed Project/Activity/Event

- **Brief description** – The project will create a methodology to generate awareness and interests among K-12 students in Science Technology Engineering and Mathematics (STEM) disciplines, and particularly in Physics. One methodology is to present and demonstrate renewable energy projects by hosting one to two days of workshops at the Physics Department of Tuskegee University and invite students from Tuskegee City’s Elementary and Public schools. We will present number of projects and provide hands-on experience to explain the Physics concepts to the core. Number of demonstrations and research projects focused in this proposed study are: (i) solar energy principles and conversion, (ii) wind energy, (iii) Photovoltaics and water electrolysis, (iv) Hydrogen and Fuel Cell Technologies, (v) Hydrogen Storage, (vi) Bio-energy, (vii) clean drinking water using sunlight and photocatalysts, (viii) dye-sensitized solar cells for electricity generation, (ix) electric (plug-in) hybrid vehicles etc.
- **Goals of the project**- The proposed project will accomplish its mission by creating a platform to demonstrate the phenomenal principles and applications of Physics laws to students. This will create interests to continue their studies in STEM based education.
- **Intended audience** – The target audience are students from Tuskegee City Elementary and High Schools. At least 50-100 students will benefited by attending the workshops. We will focus initially 6th grade to 12th grade students in the first batch of workshop and related hands-on training activities.

- **Background and motivation** – The Students of Physics Society, Tuskegee University chapter have been participating routinely in the service day activities at Tuskegee City. TU-SPS (both SPS office bearers, students, and their faculty advisors) visited Tuskegee Elementary Public in November 09, 2012 and demonstrated renewable energy projects to 6th graders. The students (~70) from all sections have attended the demonstration held in the school. The students were very excited about the various projects and in



fact asked many scientific questions to presenters. This experience has motivated the SPS team to craft this proposal for conducting workshops at Tuskegee University. With the support of MWW award, it is expected to accomplish and outreach to at least 200 students and the accompanying Science/Math teachers.

How Proposed Activity Promotes Interest in Physics

The proposed project activity on introducing renewable energy workshop and demonstration will create interest in Physics to the K-12 students and school teachers and pave the ways to realize the Marsh W. White Award set forth goals. For example, if the project participants introduce the subject of “Solar Energy” for the conversion of light energy to electrical energy, a general perspective about the laws of conservation of energy will be discussed with K-12 students at an appropriate level. Similarly for the concept of “wind energy”, for the motion of wind turbines, the associated Physics principles such as inertia of wind blades, Newton’s laws of motion ($F = ma$), idea about the property fluids etc. will be discussed briefly. As we all know, by observing some demonstration will provide better understanding the Physics concepts to core when compared to surface level of reading subjects. In this renewable energy workshop, the project participants will provide hand notes and other supporting documents, home work assignments etc. to keep interacting with the students beyond the workshop period.

This proposal is very appropriate for the Marsh W. White Award, since it has components of inculcating attitude of smart thinking the Physics principles and laws by doing hands on activity. The renewable energy concept is emerging and it is very right moment to introduce the concepts to students who are the pillars of 21st century energy sustainability planet. This proposed project is worth getting support from MWW Award committee to showcase the strength of SPS TU chapter activities and engage the Macon County schools to appreciate and create interest in Physics and other STEM disciplines as well.

Plan for Carrying Out Proposed Project/Activity/Event

- **Personnel** – SPS office bearers will be in charge of planning the event that is to announce the workshop date, time and location. SPS project participants will work jointly for organizing the workshop activities. The progress will be monitored by bi-weekly or monthly meetings and in Physics colloquia and other meetings. SPS faculty advisors will monitor the progress by evaluating the project with defined metrics.
- **Marketing** – SPS project participants including office bearers will work on the marketing strategies such as (i) contact the school administration, (ii) workshop logistics, (iii) budget allocation and (iv) feedback survey. The satisfactory participation and outcome will be analyzed by standard survey metrics and other methods.
- **SPS member participation** – Eight SPS members will be participating at various capacities as program organizers, marketing personnel, presentation speakers, and demonstration booth in-charge. Physics Minors will be recruited for helping the SPS project participants to smooth functioning of the workshops.
- **Expertise** – SPS faculty advisors will monitor and assist the SPS project participants with their wide expertise in conducting the proposed workshop in timely and professional manner.

The proposed activity will be successfully completed by preparing interim and final reports subjected to the MWW award guidelines. The online survey will be done to analyze the feedback outcomes of the workshop so that it will lead us to continue improvise the future meetings. Focus will be devoted to analyze the level of creating interest in Physics among K-12 students.

Project/Activity/Event Timeline

TASK NAME	Jan-May14				
	Jan	Feb	Mar	Apr	May
Organizing Workshop on Renewable Energy to K-12 Students					
Deliverables (Interim Report, Final Report Submission)					

Activity Evaluation Plan

Keeping day to day log books, records of activities, distributing survey questions to participants of the workshop will enable us to evaluate the proposed project activity at a periodic way. The following metrics will be adopted in our activity evaluation plan:

- **Attendance or participation numbers:** Attendance sheet or roaster (electronic) to account for number of participants, time and date attended, assignment activity, hands-on training session participation etc.
- **Survey results from participants:** Results from the survey of workshop participants will be evaluated to refine the project scope and related issues.
- **Feedback from key participants:** Workshop key participants such as schools teachers, other Tuskegee University students, faculty and outside evaluators (invitation will be made if necessary) feedback will used to evaluate the project activity.
- **Evaluation Focus to MWW Award Criteria:** All of the above evaluation plan are aligned in such a way that the workshop on renewable energy and related topics create or enhance the interest of Physics discipline among students and/or the general public as the set forth target for Marshal W. White Award.

Budget Justification

Budget Justification for TUSPS Outreach Flyer: Flyer will be prepared by the project participants for distribution to Tuskegee City schools. It is estimated that \$0.5/ per flyer for at least 100 flyers will be printed for this activity. Flyers are necessary to attract local schools and enroll students for the one or two days outreach program. Moreover the flyers will give good visibility to the general public about the MWW Award.

Budget Justification for Solar Panels: Photovoltaic solar panels (at least) will be procured at the rate or \$20/solar panel for renewable energy demonstration projects. Solar panels will be used to demonstrate how the light energy is converted to electrical energy by exposing it to sunlight or simulated light. Students will try to work in groups to establish a current and voltage relation of energy production.

Budget justification to procure stationeries: Stationeries such as letter head notebook, pen, pencil, eraser and other materials will be purchased for distribution to workshop participants. It is planned to print the TUSPS logo on the pen sets so that the school children will remember the day activities and reflect their interests in Physics and other Science disciplines.

In-Kind Support: The Department of Physics will support all the endeavor of the SPS project activities and supplement with resources for the smooth functioning of the proposed project. Lab demonstration equipment is already available at the Physics research laboratories of the TUSPS chapter which can be very well leveraged for the proposed workshop on renewable energy.