

## Marsh W. White Award Proposal

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Project Proposal Title	Boston WaterWorks
Name of School	Northeastern University
SPS Chapter Number	4935
Total Amount Requested	\$500.00

### Abstract

*The abstract should be **no more than 50 words**. The abstract should be a standalone description of the proposed project/activity/event, appropriate for posting on the SPS website or publishing in *The SPS Observer*. The abstract should be in paragraph form and should include the school name, a brief description of the proposed project, and a brief statement about the motivation for the project.*

WaterWorks aims to gather K-12 students in the Boston area and provide them the materials to build a sail boat and a working water pump. Presented by Northeastern University's chapter of SPS, this event will foster innovative thinking, physics-related fun, and some friendly competition.

## Proposal Statement

The entire Proposal Statement should be no more than 2 pages, and organized as follows.

### Overview of Proposed Project/Activity/Event

*The Overview should be a more detailed description of the proposed project/activity/event than the abstract.*

*This section should include:*

- *Brief description – What will the project look like?*
- *Goals of the project – What will the project accomplish?*
- *Intended audience – Who is the target audience and how many people will be impacted?*
- *Background and motivation – What is the context and motivation for the project? This might include a discussion of how the projects builds on a previous project carried out by the chapter, where the idea came from, or why the chapter is well-positioned to carry out this project.*

*This section should explain to reviewers WHAT the project is and the context in which it will be carried out.*

WaterWorks will educate students of all ages about the physics of water. This event will take place on Magazine beach in the Spring, but the preparation for the event will start long before that. Throughout the Spring semester, starting in January, students at Boston middle and high schools will start working on two projects. The first project requires students to design a sail boat. Undergraduates from the Northeastern University SPS will visit the schools once every two weeks and help the students with the boat design while teaching them important concepts like buoyancy and streamlining. The second project requires students to design a simple water pump. Like the first project, Northeastern students will visit the schools and help the students with the pump design while teaching them about important concepts like energy and efficiency. On WaterWorks day, students will bring their ideas to Magazine Beach and will be provided the materials and time to build their boats and pumps. The boats and pumps will all be tested and judged by Northeastern SPS members and prizes will be given. Elementary students are also invited to attend WaterWorks day - along with the boat and pump competitions, we hope to offer several fun and informative presentations involving water and physics for the general public.

### How Proposed Activity Promotes Interest in Physics

*This section should be a detailed description of how the project will meet the stated goal of the award: to promote interest in physics among students and the general public. The text should explain why the project is appropriate for a Marsh W. White Award.*

*This section should explain to reviewers WHY the proposed project is worthwhile and WHY it should be funded by a Marsh W. White Award.*

Students studying physics, or science in general, gain interest when they can see a direct application to their studies. By building boats and water pumps, they are able to see how easily ideas can transform into physical, measurable experiments. Looking out on the Charles River, one can see tens of sailboats gliding on the water.

But how do these boats really work? We use water every day: from our sinks to our showers. But how does the water travel from one place to the other? The Northeastern Chapter of SPS wants to teach students about the physics behind these everyday situations dealing with water. Receiving the Marsh W. White Award would allow us to hold our proposed WaterWorks event and purchase the appropriate materials needed to make the day a success. Most importantly, it would give us the means to educate students whilst having a lot of fun.

## Plan for Carrying Out Proposed Project/Activity/Event

*This section should detail the plan for carrying out the project, in bullet or paragraph form. Include, at minimum:*

- *Personnel - Who will be in charge of planning the event and how will progress be monitored?*
- *Marketing - How the project will be marketed to the target audience to ensure satisfactory participation?*
- *SPS member participation - How many SPS members or volunteers are likely to participate and in what capacity? Will volunteers be recruited from other groups as well?*
- *Expertise - Are there SPS members or others with special expertise that will help to ensure success?*

*This section should tell reviewers HOW the proposed activity will come to fruition. Please include adequate details so that reviewers see evidence of thoughtful planning.*

- Four members passionate about the project will form a committee to see the project carried out
- Progress goals including, but not limited to, the following will be set:
  - Recruit 3-7 high schools to participate in the event
  - Form a “visit shift” schedule of SPS members to visit these schools
  - Draft Project Guidelines and Curriculum
  - All teams have a design finalized before the event
  - Secure venue
  - Petition department/college to sponsor lunch
  - Secure lunch catering
  - Form volunteer list
  - Assign volunteer tasks
  - Promote event to greater public and elementary schools
  - Construct demonstrations
  - Make agenda for the presentation day
  - Prepare awards
- SPS representatives will visit local high school teachers to recruit their classes as teams
- The event will coincide with the popular “Cambridge Science Festival,” another STEM outreach event. We will cross-promote each other’s events to utilize their promotional channels.
- The planning committee will execute the bulk of the preparation.
- All SPS members (~20) will be involved in the visit shifting to the high school through Spring.
- Partnerships with the Northeastern University “SailBot,” “Concrete Boat,” and Sailing Team will be sought to provide extra manpower to the event day for demonstrations and other activities.
- There exist SPS members especially experienced in K-12 outreach, K-12 teaching, sailing, and engineering to provide useful insight to this project.

## Project/Activity/Event Timeline

*This section should detail the timeline for carrying out the project. Work backwards from the project date and include key milestones and the dates by which important details needed to be finalized in order to complete the project on time.*

*This section should tell reviewers WHEN the planning efforts and proposed activity will happen.*

- Late April – WaterWorks Day
- Early April – Confirm catering, train volunteers
- March – Collect awards, construct demonstrations, complete event day agenda, secure volunteer contributions from other student groups
- February – Join the “Cambridge Science Festival” promotional campaign, secure any University originating funding, order awards
- January to April – Conduct project development visits to high school teams
- January – Recruit high school teams, reserve venue, plan curriculum and project guidelines, prepare promotional materials (flyers, website, etc.)

## Activity Evaluation Plan

*The Activity Evaluation Plan should be no more than 300 words. This section should explain how the chapter will evaluate the success of the activity in meeting the goal of the award—promoting interest in physics. This may be as simple as keeping accurate records or administering a short survey of participants.*

*Some key metrics of success might be:*

- *Attendance or participation numbers*
- *Survey results from participants*
- *Feedback from key participants*

*This section should tell reviewers HOW the chapter will evaluate whether the proposed activity promoted interest in physics among students and/or the general public.*

The following assessment tools will be used:

- The number of high school teams initially recruited out of all recruitment attempts
  - *Was there initial interest in the project?*
- The change in high school team size from January to April
  - *Did the project grow more/less popular as they progressed?*

- Team requests after initial recruitment
  - *Did other schools hear about the project and want a team of their own?*
- Census at entrance (Adult, Elementary Student, High School Student, etc.)
  - *What are the attendee demographics?*
- Before/after curriculum team surveys
  - *Change in response to “What is the physics of boats/pumps?” before and after participation*
- Interest in future event
  - *How many attendees/schools demonstrate interest in a future event*

## Budget Justification

*The Budget Justification section should be no more than 300 words. This section should justify the expenses outlined in the Budget Proposal. For example, if the funding will be used to purchase volunteer t-shirts, explain why volunteer t-shirts would be useful and how they would help meet the goals of the project. (The actual budget must be submitted as a separate file, created in conjunction with the “Marsh White Award Proposal Budget Template.”)*

*Include information about any money or supplies coming from other sources that will leverage the funding requested from SPS. Include in-kind funding and support (borrowed equipment, etc.) that will be used in carrying out the project.*

*The Marsh White Award Proposal Budget should tell reviewers WHAT the funds will be used to purchase. This section should explain to reviewers HOW the items listed in the budget will help accomplish the goals of the project and of the Marsh White Award more generally.*

As a construction activity, supplies for the construction of the teams’ projects will need to be purchased. Pump raw materials will be constrained to \$50 and boat raw materials to \$100, per team. These materials are primarily necessary to for the teams to carry out their projects and apply what they’ve learned. As the event day will likely be for the entire day, lunch will either need to be provided or readily available for purchase. If all expected funding is secured – lunch will be provided. Awards will be purchased to reward hard work and interest in the subject matter. As opposed to a trophy or medal, awards will be functional objects which incorporate the them of the event and which themselves provide future learning; they will be like mini-demonstrations to live in the classrooms of the teams and encourage further interest after the event. Promotional materials will be printed in-kind by the university and distributed electronically. Travel reimbursements will be provided allow SPS members to visit high school teams throughout the semester to coach them. Signage will be printed to encourage an exciting environment for the event day. Fees to use the venue – which is on the river and necessary for teams to test their projects on – are also included. For K-12 visitors not associated with teams, the demonstration booths will provide a secondary outreach initiative – costs to construct these

booths are included. Finally, ~5% of the budget is allotted as miscellaneous expenses to cover any budgetary misjudgements or unexpected costs.