

Texas Lutheran University Society of Physics Students

# TLU SPS

# Afterschool Special

*A collaborative Outreach Program with Seguin Independent School District  
Afterschool Centers on Education (ACE) Program*

SPS Chapter: 7902

Texas Lutheran University  
Seguin, TX

**Requested funds: \$500 -**

## **ABSTRACT**

The Texas Lutheran Society of Physics Students (TLU SPS) will team up with a unique after school program called Afterschool Centers on Education (ACE), a program within the Seguin Independent School District, where we will interact with underrepresented populations, primarily from the LatinX community. TLU SPS members will visit students their time mentoring elementary school children. We will present exciting labs to the ACE students during our monthly programs. The goal of the program is to introduce elementary and middle school students to some physics ideas that they may not encounter in their regular curriculum, and to reinforce some concepts through fun activities. A secondary goal is to build relationships between the SPS members and the ACE students through regular meetings and authentic mentoring. Ultimately, we hope to get younger students interested in learning physics through lab related activities and encouragement from our SPS volunteers.

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**November 15, 2021**

## Overview

TLU SPS volunteers will interact with 18-30 ACE students for five afterschool sessions. We met with the director of ACE, Stephanie Hill, who supervises the daily afterschool program designed to support academic enrichment and citizenship. In order to be able to reach multiple students we think visiting their facilities is beneficial, rather than having them figure out the logistics of coming to us, since only a subgroup of the ACE students would be able to visit the TLU campus. These interactions will provide a role model situation for the impressionable children and hopefully heighten their interest in physics.

## Description of the ACE program

The Texas Afterschool Centers on Education program “aims to improve student academics, attendance, and behavior while providing an interactive learning space for students and families who would not otherwise have such opportunities” (Seguin ISD) This program has been implemented in 7 elementary schools and 2 middle schools. As a result of virtual learning, most of these students have a gap within their level of education and this program helps to fill those gaps that might be missing. Last year in Seguin ISD, 57.1% of students were considered at risk of dropping out of school and 11.4% of students were enrolled in bilingual and English language learning programs. Demographically, over 70% of Seguin ISD identify as Hispanic.

## Basic Outline of the Program (AND A TIMELINE)

- We will open the program with a visit to ACE in late January to make introductions between TLU SPS volunteers and ACE student participants. In this opening meeting we will present some “WOW” style demonstrations to try and generate excitement and interaction with the SPS mentors. Some examples of our demonstrations are
  - Bernoulli Principle:
    - Blowing a ping pong ball out of a funnel (audience participation)
    - Following by levitating inflated balls
  - Vortex Cannon
  - Ping Pong Ball Vacuum cannon
  - Marshmallows in Space
  - (grand finale) – Seeing the world a different way (Diffraction glasses)
- For the next four visits we will bring hands-on laboratory style activities to the ACE Center so that students can get engaged in doing some science.
  - **Simple machines**

This lab will re-enforce concepts that most students in Texas are required to learn, with leverage (simple lever), mechanical advantage, and wheel-axle experiments (pulleys). In addition, we will bring computer interfaced force sensors to understand so that they can see the measurements of the forces involved directly.
  - **Hot and Cold**

With this lab experience, students will build their own simple thermometer and test the

function of the thermometer with liquid nitrogen, ice water, and boiling water, all safely supervised by the multiple SPS volunteers. The extension will be to investigate material properties under the influence of liquid nitrogen and predict and determine how the material properties change. We will also bring along our cool thermal imaging camera to demonstrate how heat is everywhere, even when things seem “cold”.

- ***Acoustics – understanding sound waves***

With this lab experience, students will explore the general idea of waves, especially applied to the field of acoustics and sound properties. By using a microphone and a sound recorder, students will be able to “see” the differences between many kinds of sound, including their own voices and various musical instruments that they are familiar with. Several of the SPS officers are active in the local Mariachi de Juan Seguin, so that familiar musical instruments are available for demonstration in this lab.

- ***Light and Matter***

With this lab experience, students will go back to the diffraction glasses introduced in the first meeting to explore how we use light to understand properties of matter. One interactive activity will be examining light from ordinary LEDs vs light from a small laser pointer to show the meaning of monochrome light. Then we will bring gas tube lamps so that students can observe the spectrum of Hydrogen, Helium, Neon, and Mercury to understand the spectral signatures of each element. We will extend this to astronomy with images of stars and the spectral signatures that allow us to understand their composition.

- Each of the sessions will be about an hour long, leaving plenty of time for informal interactions, help with homework and getting to know each other. All STEM sessions will be planned and presented by SPS student volunteers. The effort will be led by the SPS Officers and Leadership team, but we hope to engage several first year students in this outreach as well.
- Most of the equipment, materials, and supplies for each lab experience are already available from the TLU Physics Department. The requested Future Faces of Physics award money will be used for consumable supplies and items for the participants to take home, along with t-shirts for all participants.
- Each student will be given a brief lab write up that will guide them in step-by-step procedures as well as outline the theory and mathematics behind the experiment for their understanding. These write ups will be adjusted to be grade level appropriate with the help of our advisor, Dr. Sauncy. The flexibility of these write ups is key, since we are dealing with a diverse group of students and a range of grade levels. Students will be encouraged to take the mini-lab home and discuss with their families. Labs translated in Spanish will be offered to any of those who need it. Older students will be engaged in more challenging questions during the lab experience.

**Background about TLU SPS.**

TLU is in a small south Texas town, populated by primarily low income, working-class families, making this a perfect opportunity to make a difference in the future faces of the Physics community. Students in the ACE program need strong role models that can influence their decisions to study and stay in school. It is our mission with the multiple visits to allow the student presenters to establish mentoring relationships with the afterschool students.

**BUDGET Justification**

40 T-shirts for students and presenters @ \$10.00 each.....\$400.00

We hope that we can reinforce the relationship building goal by having t-shirts for the student participants that match those of the mentor presenters. A local Hispanic-owned business will be used to source the t-shirts.

Consumable Supplies.....\$100.00

Theses consumables include liquid nitrogen, diffraction grating glasses, marshmallows (for pressure demonstrations and for freezing with liquid nitrogen) and other supplies as needed for the demonstrations described above.