

Kit Grant Application

APPLICANT'S ORGANIZATION

Example High School

ORGANIZATION'S WEBSITE

examplehighschool.edu

ORGANIZATION'S ADDRESS

1234 Street Name Avenue
City, Michigan 12345
United States

PROJECT LEADER'S NAME

Jane Doe

PROJECT LEADER'S EMAIL

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CONTACT PHONE NUMBER

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PROJECT TITLE

The Chemistry of Construction Materials

PROJECT SUMMARY

The Chemistry of Construction Materials project will be the thematic focus for the fall semester of my 11th grade Chemistry class during the 2021-22 and 2022-23 school years. During this semester we will study chemistry through the lens of materials science, particularly the materials science of construction materials. Through this project I will teach much of the traditional introductory chemistry content including: classification of substances, the atom, chemical bonding, the periodic table and chemical reactions. I will also devote specific attention to the chemistry of building materials like steel, concrete and glass; and will also delve in more deeply to engineering concepts and materials testing. All 11th grade students at Example High School will directly benefit from this project and future students and visitors to our campus will benefit through the student projects created by the students as part of this project described later in this proposal.

Example High School is in the process of designing and constructing a new permanent facility. The construction should begin this summer and will be ongoing throughout the 2021-22 school year with a target completion of August 2022. This once in a generation building project will make this educational project exceptionally relevant to students and provide an anchoring phenomena.

I am confident I can execute this project as proposed. I have 15 years of teaching experience, 10 in this current position as a chemistry instructor in a project-based school. I have attended the ASM Materials Camps 1 & 2 so I have been exposed to many of the demonstrations and labs facilitated by the Materials Science Classroom Kits. I am also involved with the design and building process as the faculty representative so I have been cultivating relationships with the architects and general contractor that may lead to additional educational opportunities, site visits, guest speakers etc. I am very excited about this project because I see it as a once in a career opportunity to create permanent installations in our new facility. I know that I will learn a lot of new things about construction and construction materials through this project, but I am very comfortable with both the basic chemistry and materials science content because I have taught the fall semester of my Chemistry class through a Materials Science lens several times before.

The success of this project will be evaluated by assessing student mastery of chemistry and materials science content, the quality of projects they produce and their level of enthusiasm/engagement with the curriculum and project. I am seeking two Materials Science Classroom kits, two Mini-Materials Demonstration kits and supplemental funding of \$120 for a total value of \$720.

ANTICIPATED START DATE

08/23/2021

ANTICIPATED END DATE

12/09/2023

TARGET AUDIENCE

11th grade chemistry students at Example High School

APPROXIMATE NUMBER OF PEOPLE SERVED BY THIS PROJECT

60

GEOGRAPHIC AREA TO BE SERVED BY THIS PROJECT

Example High School area

HOW MANY MATERIALS SCIENCE CLASSROOM KITS ARE YOU REQUESTING? (0 TO 10)

2

HOW MANY MINI KITS ARE YOU REQUESTING? (0 TO 50)

2

WHAT IS THE TOTAL AMOUNT OF SUPPLEMENTAL FUNDING YOU ARE REQUESTING? (UP TO \$600)

\$120

BRIEFLY DESCRIBE HOW YOU WILL USE THE SUPPLEMENTAL FUNDING.

I plan to using the Engineered Concrete lab, Candy Fiber Pull lab, Thermal Shock demonstration, Thermal Processing of Bobby Pins lab and Glass Bead on a Wire lab, Fiber optics demonstration and aluminum nail demonstration as part of my curriculum during the semester. Additionally, I may use the Shape Memory Alloy demonstration and How Strong is Your Chocolate lab if time allows during the semester.

Budget

Item Quantity Needed Cost Vendor Total Cost

Portable Bunsen Burner for Propane Cylinder 5 18.85 Amazon \$94.25

Propane Cylinders 4 13.87 Walmart \$13.87

Portland Cement 1 (47 lb bag) 7.27 Home Depot \$7.27

Popsicle Sticks 1 (200 count) 4.59 Amazon \$4.59

Polystyrene bowls 4 (50 count) 2.44 Amazon \$9.76

Disposable Plastic Cups 2 (100 count) 14.99 Amazon \$29.98

Total \$159.72

Additional funds to purchase the equipment and consumables listed above beyond the \$120 requested will come from my classroom budget. Any other needed supplies (like disposable gloves) are either already available at the school or will be purchased with my classroom budget.

STATEMENT OF NEED

It is essential for young people to see the relevance of science to the "real-world." Materials science is a perfect lens by which to study chemistry because its relevance is easily displayed and the relevant chemistry concepts are well-suited to an introductory chemistry class.

This project will immediately benefit the cohorts of chemistry students I will be teaching in the 2021- 22 and 2022-23 school years. I have chosen to focus on these cohorts because Example High School is in the process of building a new permanent facility. Construction will start this summer and aims to be complete by the fall of 2022. There will be a high level of intrinsic student interest in the building process and building materials during this period of time. Furthermore, because we are moving into a "blank slate" in the Fall of 2022 it is an opportune time to have students create projects and installations that can be displayed in perpetuity in the building, showcasing the relevant chemistry and science of construction materials to all future visitors and students.

The consequence of not funding this project now is missing out on the opportunity to engage students with the chemistry of construction materials when there is the most immediate relevancy to their lives as well as not creating an opportunity for the ongoing education of the community when people visit the school.

GOALS AND OBJECTIVES

This project consists of three distinct elements. Firstly, there are the in-class demonstrations, labs and direct

instruction experiences the students will have as part of my Chemistry class during the fall semester of both the 2021-22 and 2022-23 school years. Broadly speaking I intend to teach a considerable amount of introductory general chemistry while using construction materials like glass, concrete, metals (steel, aluminum, copper) and polymers as the anchoring phenomena for the chemistry. At the end of the semester, the students should have a basic understanding of how these construction materials are made, their general properties, how their properties can be manipulated and why they are used in particular roles/elements of the building. From a chemistry perspective, students should have a strong understanding of how a material's properties depends on its atomic, molecular or microstructure.

Additionally, they should be comfortable with multiple ways to represent substances including macroscopic, symbolic and particulate representations. I will also introduce other basic chemistry topics like chemical reactions through cement manufacturing, classifications of substances/materials, chemical bonding, the periodic table etc. Much of this content and materials science integration is supported by curriculum I acquired through ASM Materials 1 & 2 Camps. I will be assessing the success of this work through the evaluation of student lab work, informal and formal assessments that accompany demonstrations and formal assessments like tests.

The second and third phase of this project will be student projects. In year 1 students will design prototypes of installations/exhibits that can be displayed at the new school. These exhibits will showcase different construction materials/elements of the school (foundation, wall systems, mechanical systems etc.) and then explain the relevant chemistry/science of the materials or processes involved. In year 2, students will take the prototypes from the previous cohort, critique and refine them and then ultimately build and install them on the new campus. This project has an element I have never explored before, having students use a previous cohort's products as the starting point for their projects. It is my hope and intention that this will lead to more refined products and increased academic connectivity between the grades. The success of this project will be evaluated based on the completion and quality of student projects.

IMPLEMENTATION PLAN

Because I am implementing this in my own classroom I will have complete autonomy to ensure the activities are being integrated into the curriculum when they are best suited to achieve my learning goals for students. I will evaluate student knowledge through formal and informal assessment processes that I regularly use in the classroom. As needed, I will reteach content or skills the students do not show mastery of. I will evaluate student engagement informally throughout the semester and with the content through an end of the semester feedback survey that will ask specific questions about labs and demonstrations in the class. This survey will also have questions about the capstone project. I will also be able to gauge the effectiveness of the project by the quality of student projects produced and student engagement during their project work.

This project will have a sustaining impact through the projects created by the students that will be permanently on display in the new building. I may also help the architects and general contractors to develop lessons they take to other schools they work with on school construction projects.

If I reteach this project beyond the next two years there will be a need to purchase consumable supplies for the Engineered Concrete lab, Candy Fiber Pull lab, Thermal Shock demonstration, Thermal Processing of Bobby Pins lab and Glass Bead on a Wire lab when they are used. However, these supplies can be purchased out of my classroom budget.

HOW DID YOU HEAR ABOUT THIS GRANT OPPORTUNITY?

ASM International

APPENDIX

N/A

HIDDEN FIELD

03/13/202324.214.159.68