

Chariho Regional School District

Course Proposal

5th STEM: Introduction to Engineering for Sustainability

Department: Chariho Middle School Unified Arts: STEM

Duration: 1 Semester, 2 classes per week

Proposed Implementation Date: September 2026

- **Course Description:**

Integrated STEM Introduction to Engineering for Sustainability is a hands-on, inquiry-based 5th-grade semester course (2 quarters, 20 weeks, 2 classes per week) that deeply enhances the traditional 5th-grade science curriculum by weaving science, technology, engineering, and mathematics into cohesive project-based units incorporating topics related to environmental sustainability. Students work like real scientists and engineers through the Engineering Design Process while developing a deep understanding of NGSS disciplinary core ideas. The course is organized into four major units (approximately 4–5 weeks each)

Possible Units

1. Intro to the Engineering Design Process

Description: Students learn how engineers solve problems using the Engineering Design Process. Through short design challenges, students define problems, brainstorm solutions, create and test prototypes, and improve designs based on evidence and feedback. The unit emphasizes collaboration, iteration, and problem-solving skills foundational to STEM learning.

2. Intro to Water Systems

Description: Students investigate Earth’s water systems, design water filters, model watersheds, and propose solutions to real local water issues (e.g., stormwater runoff, salt-water intrusion in Rhode Island). (e.g., learning about and maintaining existing hydroponic towers)

3. Intro to Energy Transformations & Renewable Energy Engineers

Description: Students explore energy forms and transfers, build and optimize designs such as [solar ovens](#), wind turbines, and/or [simple circuits](#), then design an energy-efficient model “tiny home” for a coastal RI community.

4. Ecosystems Engineering

Description: Culminating project- Students design and build a closed-ecosystem terrarium/aquarium (bottle biology), monitor biodiversity, food webs, and matter cycling, then present solutions to improve a local ecosystem (e.g., [pollinator garden](#) for school grounds).

- **Rationale for Proposal**

Rhode Island adopted NGSS in 2013. This course provides dedicated bi-weekly STEM time to all 5th-grade Chariho students to meet the intent of NGSS three-dimensional learning (Science & Engineering Practices, Crosscutting Concepts, Disciplinary Core Ideas). It also addresses Rhode Island’s Profile of a Graduate (problem solver, innovator, collaborator).

- **Standards Addressed**

Next Generation Science Standards (Primary)

5-PS1-1, 5-PS1-4
5-PS2-1
5-PS3-1
5-LS1-1, 5-LS2-1
5-ESS1-1, 5-ESS1-2
5-ESS2-1, 5-ESS2-2
5-ESS3-1
3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3 (all units)

Common Core Mathematics

5.MD.A.1, 5.MD.C.3–5 (volume & measurement)
5.NF.B.4–7 (fractions in design)
5.G.A.1–2 (coordinate systems in Mars rover programming)
MP.1 (Make sense of problems), MP.2 (Reason abstractly), MP.4 (Model with mathematics), MP.5 (Use appropriate tools strategically)

Common Core ELA

RI.5.1–10
W.5.1, W.5.2, W.5.7, W.5.8 (research & evidence-based writing)
SL.5.1, SL.5.4, SL.5.5 (collaborative conversations & multimedia presentations)

- **Impact on Other Departments**

The course will have minimal negative impact. It consolidates and deepens existing 5th-grade science topics. Math and ELA skills are reinforced through authentic application. Art teacher collaboration possible for design sketching; library/media specialist for research skills. This course will have an impact on the current amount of time allotted for some of the other 5th-grade unified arts courses. For example, instead of 5th grade having a full year of Spanish, it could potentially be reduced to a half-year.

- **Budgetary Considerations**

There are a few required materials to run this course as planned, and a number of items that would enhance the program but would not be required. Many items can be funded via DonorsChoose, grants, or through PTO.

1. Required:

- a. Pods for hydroponic towers (currently being funded by a district grant)
- b. Updated plumbing and modifications were made to the STEM sink to be made into a work station
- c. Outdoor water spigot to be repaired
- d. Large straws for a rainwater collection model
- e. 1:1 Chromebooks already in place for research, journaling, and potential digital portfolios
- f. Two STEM teachers with middle school certification, grades 5-8, who are already in place

2. Wishlist materials:

- a. Photolights or a mini greenhouse to enable pods to be reused
- b. Consumables (cardboard, duct tape, balloons, soil, bottles, basic circuitry kits, solar cells):

- c. Reusable tools (hot glue guns, scissors, rulers, digital thermometers, clipboards)
- d. Possible field trip to Save The Bay or URI Engineering Day
- e. 1–2 document cameras for sharing student models
- f. Sound-dampening partition to separate the two classrooms in order to reduce the noise level

- **Professional Development Considerations (none are required)**

1. Wishlist items for professional development opportunities include:
 - a. Teacher completion of the Master Gardener class at URI
 - b. GemsNet Professional Development opportunities, such as the Wind Turbine workshop
 - c. Summer 2026: 3-day NGSS/STEM immersion workshop (can partner with RIDE’s NGSS cohorts or Project Lead The Way Launch training)
 - d. Four after-school PLC sessions for unit co-planning and assessment calibration
 - e. Possible peer classroom visits to Richmond or Charlestown elementary schools to observe 4th-grade STEM programs

- **Facility Considerations**

Requires two classrooms with access to a sink and counter space. Materials storage needed (one dedicated cabinet or mobile cart per room). Outdoor learning space used for watershed modeling and ecosystem projects. Existing outdoor space would be utilized. The outdoor spigot is broken and needs to be repaired. Existing STEM rooms would be utilized and greatly enhanced if a more permanent and sound-reducing partition could be installed to split the space into two classrooms more effectively.

- **Equipment Considerations**

The STEM room sink plumbing would need to be enhanced, and the workstation would need to be reconfigured to fit a larger number of activities.

- **Other Remarks**

This course aligns directly with Chariho’s 2023–2028 Strategic Plan Goal 2 (Innovative Teaching & Learning) and Goal 3 (Real-World Readiness).

Ready for SIT review and district approval for 2026–2027 implementation