



# STEAM IC CURRICULUM

ALL ASPECTS OF THE  
STEAM IC CURRICULUM  
ARE OPTIONAL.  
CHAPTERS MAY CHOOSE  
TO DROP ASPECTS OF  
THE CURRICULUM OR  
ADD MATERIAL.

- The curriculum has a tentative timeline of 11 weeks
- Resources not directly provided in this document may also be used

# TIMELINE

## SCIENTIFIC PRESENTATION | 3 WEEKS

- HOW TO WRITE AND PLAN A SCIENTIFIC REPORT AND PRESENTATION

## EVENTS | 1 WEEK

- EVENT-SPECIFIC LESSONS

## SUSTAINABILITY | 1 WEEK

- SUSTAINABILITY ISSUES ENCOUNTERED IN TODAY'S WORLD

## TECHNOLOGY | 1 WEEK

- TECHNOLOGICAL USES AND ADVANCEMENTS

## ENGINEERING | 1 WEEK

- FOCUS ON INFRASTRUCTURE, AUTOMATION, AND URBAN PLANNING.

## ART | 1 WEEK

- STUDY GRAPHIC AND ELEMENTS OF DESIGN IN THE STEAM FIELD.

## SCIENCE | 1 WEEK

- CONDUCT SCIENTIFIC DEMONSTRATIONS AND EXPERIMENTS.

## MATH | 1 WEEK

- ENGAGE IN CREATIVE PROBLEM SOLVING THROUGH HANDS-ON ACTIVITIES.

## MOCK-PRESENTATIONS | 4 WEEKS

- REHEARSING FOR STEAM ICAC

## DETAILS

**This timeline is the recommended order in which material should be discussed. It can be altered if you feel as though it is beneficial to your chapter.**

# SCIENTIFIC PRESENTATION

Discuss the structure and process of a scientific presentation. Explain the necessary elements and how to ensure that information is relayed in a clear, organized way.

## What to Include:

- Title
- Introduction
- Objectives
- Methods
- Results
- Discussion
- Conclusion
- Acknowledges

## ADDITIONAL RESOURCES

- <https://slidepeak.com/blog/how-to-create-a-scientific-presentation>
- <https://www.nature.com/srep/research-articles>
- <https://www.northwestern.edu/climb/resources/oral-communication-skills/creating-a-presentation.html>

# SCIENTIFIC REPORT

Discuss the structure and writing process of a scientific report. The report must be properly formatted and printed to present at ICAC. The max word limit is 6000 words.

## What to Include:

- Title
- Abstract
- Introduction (Background information, hypothesis)
- Methods (Procedure)
- Results
- Discussion
- Conclusion

## ADDITIONAL RESOURCES

- <https://writingcenter.unc.edu/tips-and-tools/scientific-reports/>
- <https://www.nature.com/srep/resea>

# EVENT ENGINEERING

Students will explore the concept of urban expansion into underground spaces, particularly in suburban areas expecting urbanization. The meeting will cover various urban planning strategies that improve the quality of life through the efficient and safe use of underground spaces. Students will work on designing conceptual plans for creating underground facilities in a suburban context.

## ACTIVITY

- Materials: Paper, markers, rulers, sticky notes, and optional access to urban planning tools.
- Activity: Participants will design a conceptual plan for a suburban area expecting urbanization, including proposals for using underground spaces created with aboveground infrastructure. Each group will present their plan, discussing impacts on quality of life, cost, and safety.

## ADDITIONAL RESOURCES

- <https://www.sciencedirect.com/science/article/pii/S0886779815302923>
- [https://www.routledge.com/Planning-Sustainable-Cities-An-infrastructure-based-approach/Pollalis/p/book/9780367669959?srsltid=AfmBOoq2uqGwWkIqhCYMBtm8nnWI6LmGMWTVdCIU\\_bAZoxs5iF0dwcno](https://www.routledge.com/Planning-Sustainable-Cities-An-infrastructure-based-approach/Pollalis/p/book/9780367669959?srsltid=AfmBOoq2uqGwWkIqhCYMBtm8nnWI6LmGMWTVdCIU_bAZoxs5iF0dwcno)

# EVENT

## ASTRONOMY

Students will be introduced to the study of star clusters, focusing on how they are currently classified based on size, age, and density. They will explore the limitations of these methods and discuss new ways to classify star clusters, such as by their chemical composition and orbital characteristics. Students will analyze real star cluster data.

### ACTIVITY

- Materials: Whiteboard and markers, printed handouts, computer or tablet, projector, notepads and pens
- Engage students in a discussion on the role of star clusters in galactic evolution. Encourage them to explore what additional data (e.g., spectroscopic information) could improve current classification methods and understanding of star cluster life cycles.

### ADDITIONAL RESOURCES

- <https://cas.sdss.org/dr18/>
- [https://www.researchgate.net/publication/362955934\\_Stellar\\_Classification\\_by\\_Machine\\_Learning](https://www.researchgate.net/publication/362955934_Stellar_Classification_by_Machine_Learning)
- [https://dc.g-vo.org/SP\\_ACE](https://dc.g-vo.org/SP_ACE)

# EVENT

## LIFE SCIENCES

Students will learn about the challenges faced by individuals with cerebral palsy, particularly the difficulties in performing daily tasks requiring fine motor skills. The discussion will examine current assistive technology and talk about its limited functionality. Students will brainstorm and propose ideas for new or improved assistive devices that are adaptable, discreet, and easy to use, aiming to improve independence for individuals with CP.

### ASSIGNMENT

- Materials: Clay, rubber bands, paper clips, straws, tape, and small classroom objects for testing (e.g., pencils, paper, buttons).
- Activity: In groups, participants will design and build a versatile assistive device using materials like clay, rubber bands, and straws. The device should assist with tasks like gripping, turning, or pressing. After testing with simple tasks (e.g., picking up a pencil), groups will present their device, highlighting its versatility and ease of use.

### ADDITIONAL RESOURCES

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4413218/>
- <https://www.atia.org/home/at-resources/what-is-at/>



# SUSTAINABILITY

Discuss the most prominent issues faced in the fields of STEAM related to sustainability (provide statistics). Go over methods with which sustainability is implemented in various industries throughout the world. Include ways to incorporate sustainability into participants' innovations.

## ASSIGNMENT

- Watch documentaries about the environment and climate change, such as "Before the Flood" (available on Disney+ and YouTube). Follow up with interactive quizzes on Kahoot.

## ADDITIONAL RESOURCES

- <https://www.sustain.ucla.edu/what-is-sustainability/>
- <https://www.technia.com/blog/which-industries-are-leading-sustainable-innovation/>

# TECHNOLOGY

## OPTION 1

In this activity, students will learn basic coding concepts using Scratch or Python. They'll explore how to create simple animations and games. This hands-on approach helps students understand the role of coding in innovation and technology development.

### ASSIGNMENT

- Introduce students to basic coding concepts using Scratch or Python depending on their experience. Students can create simple animations and games.
- Materials: Scratch Account, Python Compiler, Laptop.

### ADDITIONAL RESOURCES

- <https://www.forbes.com/sites/chuckbrooks/2022/12/13/4-mind-boggling-technology-advances-in-store-for-2023/?sh=7ba4e1031a40>
- <https://www.weforum.org/agenda/2020/11/heres-how-technology-has-changed-and-changed-us-over-the-past-20-years/>

# TECHNOLOGY

## OPTION 2

In this activity, students will look into fundamental characteristics of technology design, such as efficiency and power, and discuss how these factors may improve their innovations. They will create their own games using GDevelop, an open-source game development tool, and apply these principles in a hands-on, creative way. This practice will help them improve their technical abilities while understanding the importance of technology in creativity.

### ASSIGNMENT

- Students can use GDevelop, an open-source game development platform, to design their own games. This can be a multiple-meeting activity.
- Materials: GDevelop Account, Laptop.

### ADDITIONAL RESOURCES

- <https://gdevelop.io/academy>
- <https://wiki.gdevelop.io/gdevelop5/tutorials/>

# LIFE SCIENCES

## OPTION 1

In this activity, students will analyze real-life medical case studies in small groups, developing solutions and action plans. They'll enhance their problem-solving, teamwork, and communication skills by discussing scenarios and presenting their findings to the class.

### ASSIGNMENT

- Break into small groups, read medical case studies, and spend 15-20 minutes coming up with a solution, a plan of action, and a pitch.
- Materials: Printed case studies, notepads, pens.

### ADDITIONAL RESOURCES

- <https://www.hackingthecaseinterview.com/pages/life-sciences-consulting-case-interviews>

# ENGINEERING

## OPTION 1

### INFRASTRUCTURE

Students will learn about building stability in the Skyscraper Challenge by constructing the tallest, most stable structure within a time limit. Afterward, structures will be tested for stability, followed by a discussion on strategies and improvements.

### ASSIGNMENT

- Materials: Straws, tape, rulers.
- In groups, students will use these materials to build the tallest, most stable structure within a time limit. They will then discuss design choices, challenges, and strategies for improvement.

### ADDITIONAL RESOURCES

- [https://ocw.mit.edu/courses/15-792j\\_proseminar-in-manufacturing\\_fall-2005/](https://ocw.mit.edu/courses/15-792j_proseminar-in-manufacturing_fall-2005/)

# ENGINEERING

## OPTION 2

### **AUTOMATION**

Discuss the inner workings of the manufacturing industry with a focus on automatic machinery. Include the aspects engineers consider when designing a piece of machinery for a specific task

### **ASSIGNMENT**

- In groups, create a blueprint for an existing piece of machinery in any STEAM field.

### **ADDITIONAL RESOURCES**

- <https://www.monarch-innovation.com/machine-design-types-and-procedure>
- <https://www.edrawsoft.com/make-home-blueprints.html>
- <https://katanamrp.com/blog/how-to-read-manufacturing-blueprints/>

# ARTS

## OPTION 1

Students will learn about the importance of integrating art with STEAM fields and explore various ways they can express their creativity while learning scientific and technological concepts.

### ASSIGNMENT

- Organize a project where students create architectural drawings of a room. This assignment involves students using their creativity and understanding of space to design a detailed and aesthetically pleasing room layout. They will learn about scale, perspective, and the elements of architectural design. The completed drawings will be judged.
- Materials: Chart paper, Sharpies, Pencils, Erasers.

### ADDITIONAL RESOURCES

- <https://www.homedepot.com/c/ab/how-to-draw-a-floor-plan/9ba683603be9fa5395fab90118babc83>

# ARTS

## OPTION 2

Students will understand the basics of graphic design & how it is used in the modern world. They will practice creating a visually appealing and effective design using the principles studied.

### ASSIGNMENT

- Create a poster with background information regarding one of the three prompts of your choosing.
- Through this assignment, members can begin to form an understanding of their prompt, while simultaneously developing creativity, and effective communication strategies.
- Materials: Paper & pencil, approved design software of their choosing.

### ADDITIONAL RESOURCES

- <https://www.adobe.com/uk/creativecloud/design/discover/graphic-design.html>



# SCIENCE

Slime breaks most of the laws by Sir Isaac Newton (non-Newtonian fluid).

Formulate a question, write a hypothesis, and conduct the slime experiment. Write down properties/observations, gather/analyze data, and write a conclusion.

## ASSIGNMENT

- Slime Experiment
- Materials: Glue, borax, water, food coloring, mixing bowls, spoons.
- In groups of three, students will gather their supplies. Students will follow the instructions provided on worksheets and create the slime. This slime can be sold at fundraisers or can be given to their creators.

## RESOURCES

- <https://stemgeneration.org/slime-science-fair-project/#:~:text=Mix%201%2F2%20Cup%20water,are%20happy%20with%20the%20consistency.>

# MATHEMATICS

Students will explore the practical applications of mathematical concepts through hands-on activities and competitive challenges, encouraging both understanding and enthusiasm for math.

## ASSIGNMENT

- Organize an activity where students use toothpicks and marshmallows to construct geometric structures. This hands-on project allows students to apply principles of geometry, such as angles, shapes, and stability. Students will work individually or in small groups to build the tallest and most stable structures they can, integrating their knowledge of geometric concepts. The activity concludes with a judging session based on height, stability, and creativity.
- Materials: Toothpicks, Marshmallows.

## ADDITIONAL RESOURCES

- <https://courseware.cemc.uwaterloo.ca/40>

# MOCK PRESENTATIONS

To prepare participants for STEAM ICAC, chapters are encouraged to hold mock-presentations. Presentations should be timed and feedback should be given based on the STEAM IC criteria

## STEAM IC CRITERIA

- [https://drive.google.com/file/d/1UipaKTn\\_WMTti8lBahOeZtpLeuBP9u\\_Yu/view?usp=sharing\\_](https://drive.google.com/file/d/1UipaKTn_WMTti8lBahOeZtpLeuBP9u_Yu/view?usp=sharing_)

## ADDITIONAL RESOURCES

- <https://professional.dce.harvard.edu/blog/10-tips-for-improving-your-public-speaking-skills/>
- <https://hbr.org/2021/11/3-group-presentation-pitfalls-and-how-to-avoid-them>