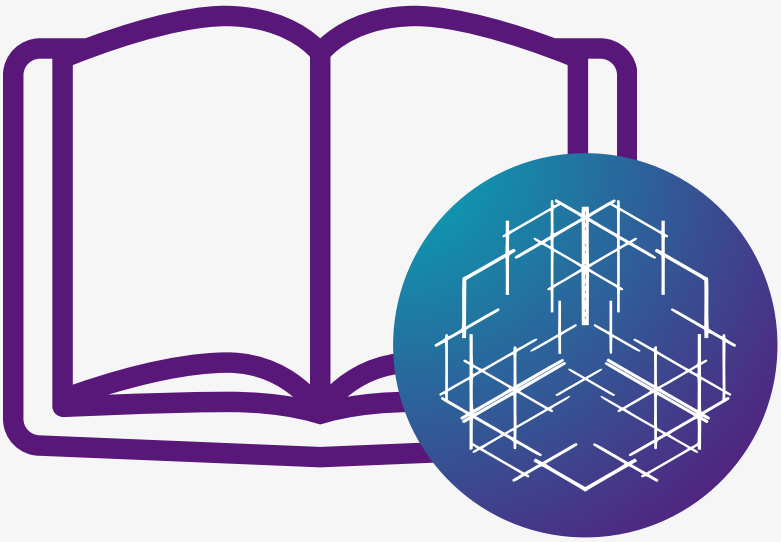

STEAM IC CURRICULUM

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 REPORT | 3 WEEKS
- HOW TO WRITE AND PLAN A SCIENTIFIC REPORT

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
- INFRARSTRUCTURE & AUTOMATION

ART | 1 WEEK
- GRAPHIC & ELEMENTS OF DESIGN IN THE STEAM FIELD

SCIENCE | 1 WEEK
- SCIENTIFIC DEMONSTRATIONS

MATH | 1 WEEK
- CREATIVE PROBLEM SOLVING

MOCK-PRESENTATIONS | 4 WEEKS
- REHEARSING FOR STEAM ICAC

DETAILS

This timeline is the recommended order in which material should be discussed.

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.

- 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/research-articles

EVENT
ENGINEERING

Explore the formation of earthquakes along with the statistics of them in Vancouver within the past 100 years. Discuss the current infrastructure of earthquake-proof housing compared to normal ones remember to consider the durability of both.

- Simulate the collapse of a residential home with and without earthquake-proof measures using classroom materials (Jenga blocks, skewers, tape, etc.)

ADDITIONAL RESOURCES

- https://earthquake.usgs.gov/earthquakes/map/?extent=-66.7949,-43.24219&extent=80.11726,384.25781

EVENT
ASTRONOMY

Solar cells are the centeral aspect of the astronomy prompt. Discuss the properties of current solar cell technology and how they are affected in space due to lunar regolith, and solar radiation conditions.

ASSIGNMENT

- without doing any external research, brainstorm the conditions of the moon and the effects it may have on solar cells in groups

RESOURCES

- https://www.esa.int/Enabling_Support/Space_Engineering_Technology/SOLARIS/Space-Based_Solar_Power_overview
- https://www.energy.gov/space-based-solar-power
- https://science.nasa.gov/learn/basics-of-space-flight/chapter11-3/

EVENT
LIFE SCIENCES

Discuss the types of arthritis along with the medication and treatment. Go over the risk factors of arthritis and what aspects of a patient's life may induce or reduce the pain.

ASSIGNMENT

- Demonstrate the joint movement with arthritis using classroom materials (skeleton bones & clay)

RESOURCES

- https://www.cdc.gov/arthritis/basics/types.html
- https://www.hopkinsmedicine.org/health/conditions-and-diseases/arthritis#:~:text=or%20more%20joints.-,There%20is%20no%20cure%20for%20arthritis.,reduction%2C%20exercise%2C%20and%20surgery.
- https://www.cdc.gov/arthritis/basics/management.htm

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.

RESOURCES

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

TECHNOLOGY

Technology is rapidly developing and becoming an integral part of our world. Go over the many aspects which are considered when designing new technology including efficiency and power. Discuss how technology can be incorporated into the participants' innovations.

- Some recent advances in technology include:
  - Artificial intelligence
  - Databases
  - Robotic Process Automation (RPA)

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/

ENGINEERING

OPTION 1

INFRASTRUCTURE

Discuss the aspects that are taken into consideration when designing infrastructure. Include the process of project management.

ASSIGNMENT

- Create the framework of a modern residential home with classroom materials (popsicle sticks, cardboard, legos, etc.)

ADDITIONAL RESOURCES

- https://www.thespruce.com/framework-4127807
- https://todayshomeowner.com/general/guides/house-framing-2/

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

Discuss the importance of graphic design in the STEAM fields. Go over methods in which participants can apply their creativity to their innovations.

ASSIGNMENT

- Conduct a discussion where participants analyze existing innovations for elements of graphic design
- Discuss the similarities and differences between art and science.
    - Does graphic design ever improve the functionality of a innovation? If so when?

ADDITIONAL RESOURCES

- https://brainstation.io/career-guides/what-is-graphic-design

SCIENCE

Discuss the scientific concepts used in the event prompts. Chapters may also choose to create scientific demonstrations using any materials available to them.

ASSIGNMENT

- Life Sciences
  - pain receptor and the nervous system
  - Types of Joints and Their purpouse
- Astronomy
  - gravity's effect on debris on the moon and space
  - impacts of the moon's rotation and orbit on its environment
- Engineering
  - The cause of earthquakes and the theory of Plate tectonics
  - Gravity on the earth kinematics

ADDITIONAL RESOURCES

- https://writingcenter.unc.edu/tips-and-tools/scientific-reports/
- https://www.nature.com/srep/research-articles

MATHEMATICS

Discuss the skills of creative thinking and methods of problem-solving. Go over ways in which participants can transfer their mathematical skills to their innovations.

ASSIGNMENT

Practice Problem by CEMC POTW 7

Kurtis is creating a game for a math fair. They attach n circles, each with radius 1 metre, onto a square wall with side length n metres, where n is a positive integer, so that none of the circles overlap. Participants will throw a dart at the wall and if the dart lands on a circle, they win a prize. Kurtis wants the probability of winning the game to be at least 1 2 . If they assume that each dart hits the wall at a single random point, then what is the largest possible value of n?

Solution : https://cemc.uwaterloo.ca/resources/potw/2023-24/English/POTWD-23-D-07-S.pdf

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 CRETERIA

- https://drive.google.com/file/d/1UipaKTnWMTti8lBahOeZtpLeuBP9u_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