# MORGAN STATE UNIVERSITY

# SCIENCE-MATHEMATICS-ENGINEERING FAIR

# VIRTUAL GUIDELINES

**Sponsored by:**


**School of Education and Urban Studies**
**Center for Excellence in Mathematics and Science Education**
**(CEMSE)**

**A Regeneron International Science and Engineering Fair (ISEF) Affiliate**

# MSU Virtual Science Fair 2022

## Project Registration Guidelines

- These guidelines have been established to address a judging process that will occur virtually and through a digital medium.
- The Virtual Science Fair will be (4) parts:
    - Each student will be required to complete and submit a virtual presentation **(Please reference Appendix II)**
      **NOTE: THE QUAD CHART IS TO BE USED AS A TEMPLATE FOR DEVELOPING YOUR VIRTUAL PRESENTATION.**
      (Please reference Appendix I. Quad Chart Instructions and Figures 1, 2 or 3)
    - Each student will be required to create a science fair project poster board.
    - Each student will be required to create and submit a video tape of the science fair poster board presentation in a **mp4 format ONLY.**
- There will be two classifications of students who can participate in the 2022 Science Fair:
    - Middle Schools Students Grades 6, 7 and 8
    - High School Students Grades 9, 10, 11 and 12
- There will be four categories of judging for Middle and High Schools registrants:
    - Biological Science
    - Physical Science
    - Earth & Environmental Science
    - Engineering/Mathematics/Computer Science
- Team Projects will be accepted at the 2022 Science Fair.
- Video Presentation Requirements
    - A video should summarize the project at a high level.
    - Videos lengths should be a minimum of 10 minutes with a maximum of 15 minutes
    - Do not include anyone in your video other than the student researchers of the project.
    - Your videos will not be edited. To ensure your video is the best representation of your work, please keep these best practices in mind while filming:
        - Film yourself in a well-lit and non-distracting environment so the viewer's focus stays on you and your work.
        - For best results, film your video horizontally (landscape).
        - Keep the camera still and in place during filming.
        - Speak clearly and loudly enough that the recording can pick up every word you say.
        - Avoid long pauses.
        - Please speak in English.
        - Listen to your video after recording to ensure your voice is clear and audible, and that the video has not picked up background noise.
    - Video beginnings should serve as an introduction at minimum to include:
        - Students Name, Project Title, School Name and Class Grade
        - An explanation of your research question

- An explanation of your methodology and procedures for carrying out your project in detail.
- Provide and explain results at minimum to include:
    - Tables and figures which illustrate your data.
    - Relevant statistical analysis of the data.
- Discuss your interpretation of your results at minimum to include:
    - Comparing your results with theories, published data, commonly held beliefs, and expected results.
    - Discuss possible errors.
    - Did any questions or problems arise that you were not expecting?
    - How did the data vary between repeated observations of similar events? If applicable.
    - How were results affected by uncontrolled events?
    - Provide a conclusion at minimum to include:
        - What do the results mean and other work being done in your research area?
        - How do the results address your research question?
        - Do your results support your hypothesis?
        - What application(s) do you see for your work?
        - Any next steps

- Provide references as requires which should not exceed 1page, 10 -13 size font. Acceptable fonts to be used are Arial, Times New Roman, Calibri or Cambria.

## Appendix I. Quad Chart Instructions

A "quad chart" is a single page divided into four quadrants providing a high-level summary of the project. It is intended to be more visual than detailed to quickly introduce your judges to what is important about your project. Follow the model below that corresponds to the Project Presentation template you selected.

- You must use a wide-screen page format like the American Legal standard 8½"X14" and arranged in Landscape orientation.
- The page background color must be a **light color** and **text color must be predominantly dark to support readability.**
- The maximum allowable font size is 13 pt. Exception: You may use a smaller font size, down to 10 pt., for figure captions or photo credits.
- All four quadrants of your Quad Chart should each be the same size with a single border line delimiting each, as in the examples below. The Title section should be only as tall as necessary to include your project title and other identifying information (see section on Quad Chart Title).
- The Quad Chart should not include a bibliography, references, or acknowledgments.
- All Display & Safety rules must be followed.

**Quad Chart Title**:

- Title of your project
- Your name, school, city, state, and class grade

**Quadrant 1: Research Question/Engineering Objectives**

- This should reflect material in Q1 of the Chart.
- Please state the research question or engineering problem being addressed
- A leading core graphic or visual is encouraged, but not required.

**Quadrant 2: Methodology/Project Design**

- This should reflect material in Q2 of the Chart.
- Please provide a succinct, bulleted summary of the methodology/project design or framework.

**Quadrant 3: Data Analysis & Results**

- This should reflect material in Q3 of the Chart.
- It is advised that this quadrant should primarily be a graphic representation of relevant data and results.
- Text should be kept to a minimum.

**Quadrant 4: Interpretation & Conclusions**

This should reflect material in Q4 of the Chart.

This year we will be using a Science Project Quad Chart Format (Figure 1) for Biological Science, Physical Science and Earth & Environmental Science middle and high school display board submissions.

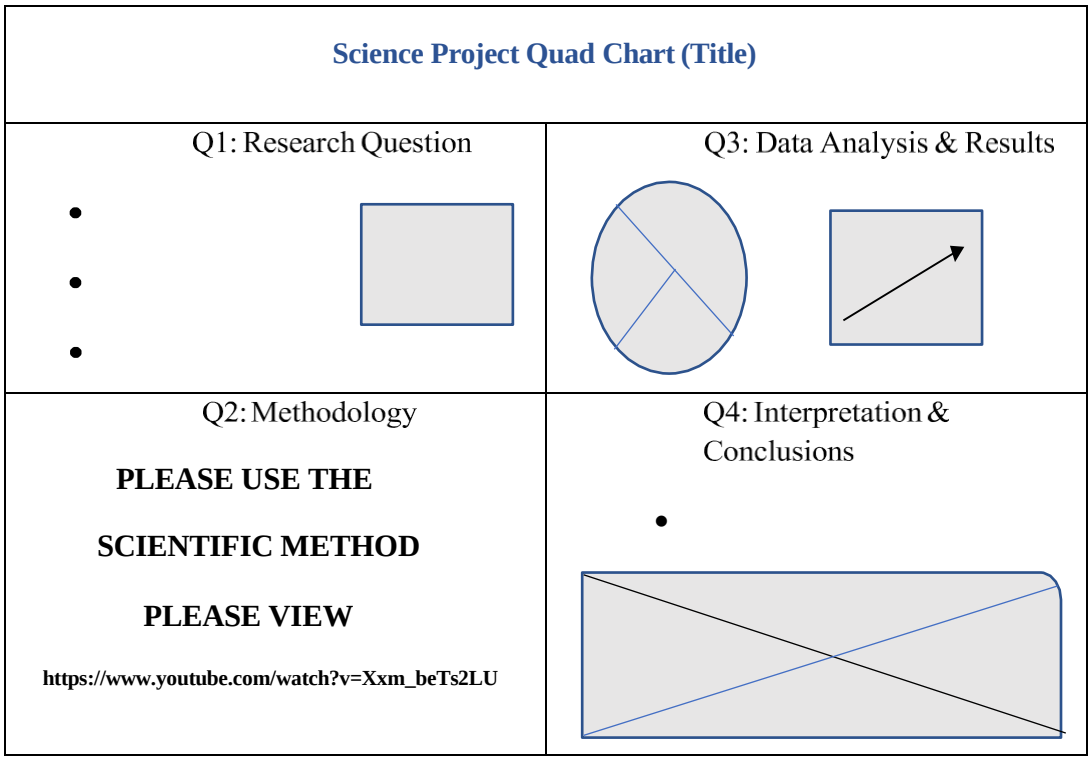


***Figure 1: Science Project Quad Chart***

## Sample 1: Project Presentation Template: Science Projects

**1. Project ID and Title**

- The following should be included: Project title, student name, school, grade, city, state and county

**2. Introduction - What is your research question?**

- Explain what is known or has already been done in your research area. Include a brief review of relevant literature. If this is a continuation project, a brief summary of your prior research is appropriate here. Be sure to distinguish your previous work from this year's project.
- What were you trying to find out? Include a description of your purpose, your research question, and/or your hypothesis.

**3. Methods - Explain your methodology and procedures for carrying out your project in detail.**

- What did you do? What data did you collect and how did you collect that data? Discuss your control group and the variables you tested.
- **DO NOT** include a list of materials.

**4. Results - What were the result(s) of your project?**

- Include tables and figures which illustrate your data.
- Include relevant statistical analysis of the data.

**5. Discussion - What is your interpretation of these results?**

- What do these results mean? Compare your results with theories, published data, commonly held beliefs, and expected results.

- Discuss possible errors. Did any questions or problems arise that you were not expecting? How did the data vary between repeated observations of similar events? How were results affected by uncontrolled events?

**6. Conclusions - What conclusions did you reach?**

- What do these results mean in the context of the literature review and other work being done in your research area? How do the results address your research question? Do your results support your hypothesis?
- What application(s) do you see for your work?

**7. References**

- This section should not exceed one page. Limit your list to the most relevant references.
- List the references.

This year we will be using an Engineering Project Quad Chart Format (Figure 2) for Engineering middle and high school display board submissions.

| Engineering Project Quad Chart (Title) | |
|---|---|
| Q1: Engineering Problem & Objectives | Q3: Data Analysis & Results |
| Q2: Project Design | Q4: Interpretation & Conclusions |

***Figure 2: Engineering Project Quad Chart***

## Sample: 2 Project Presentation Template: Engineering Projects

**1. Project ID and Title**

The following should be included: Project title, student name, school, grade, city, state and county

**2. Introduction - What is your research question?**

- Explain what is known or has already been done in your research area. Include a brief review of relevant literature.
- Explain what is known or has already been done in your research area. Include a brief review of relevant literature.
- If this is a continuation project, a brief summary of your prior work is appropriate here. Be sure to distinguish your previous work from this year's project.

**3. Framework - Notation and framework.**

- Introduce the concepts and notation needed to specify your research question, methods, and results precisely.
- Define relevant terms and explain prior/background results. (Novel concepts developed as part of your project can be presented here or in Section Q4, as appropriate.)

**4. Findings - Present your findings and supporting arguments.**

- What did you discover and/or prove? Describe your result(s) in detail. If possible, provide both formal and intuitive/verbal explanations of each major finding.
- Describe your methods in general terms. Then: o Present rigorous proofs of the theory results – or, if the arguments are long, give sketches of the proofs that explain the main ideas.
- For numerical/statistical results, include tables and figures that illustrate your data. Include relevant statistical analysis. Were any of your results statistically significant? How do you know this?

**5. Conclusion - What is your assessment of your findings?**

- How do the results address your research question? And how have you advanced our understanding relative to what was already known?
- Discuss possible limitations. Did any questions or problems arise that you were not expecting? What challenges do you foresee in extending your results further?
- What application(s), if any, do you see for your work?

**6. References**

- This section should not exceed one page. Limit your list to the most important references.
- List the references/documentation used which were not of your own creation (i.e., books, journal articles).

This year we will be using a Mathematics/Computer Science Chart Format (Figure 3) for middle Mathematics/Computer Science and high school display board submissions.

| Math/Computer Science Project Quad Chart (Title) | |
|---|---|
| Q1: Problem or Question | Q3: Findings |
| Q2: Framework | Q4: Interpretation & Conclusions |

**Figure 3: Mathematics/Computer Science Project Quad Chart**

## Sample: 3 Project Presentation Template: Engineering Projects

**1. Project ID and Title**

The following should be included: Project title, student name, school, grade, city, state and county

**2. Introduction - What is your research question?**

- Explain what is known or has already been done in your research area. Include a brief review of relevant literature.
- Explain what is known or has already been done in your research area. Include a brief review of relevant literature.
- If this is a continuation project, a brief summary of your prior work is appropriate here. Be sure to distinguish your previous work from this year's project.

**3. Framework - Notation and framework.**

- Introduce the concepts and notation needed to specify your research question, methods, and results precisely.
- Define relevant terms and explain prior/background results. (Novel concepts developed as part of your project can be presented here or in Section Q4, as appropriate.)

**4. Findings - Present your findings and supporting arguments.**

- What did you discover and/or prove? Describe your result(s) in detail. If possible, provide both formal and intuitive/verbal explanations of each major finding.
- Describe your methods in general terms. Then: o Present rigorous proofs of the theory results – or, if the arguments are long, give sketches of the proofs that explain the main ideas.
- For numerical/statistical results, include tables and figures that illustrate your data. Include relevant statistical analysis. Were any of your results statistically significant? How do you know this?

**5. Conclusions - What is your assessment of your findings?**

- How do the results address your research question? And how have you advanced our understanding relative to what was already known?
- Discuss possible limitations. Did any questions or problems arise that you were not expecting? What challenges do you foresee in extending your results further?
- What application(s), if any, do you see for your work?

**6. References**

- This section should not exceed one page. Limit your list to the most important references.
- List the references/documentation used which were not of your own creation (i.e., books, journal articles).

# Appendix II
# Science Fair Virtual Presentation Template

# Science fair slide presentation template

The following slides are a template for your presentation. This will take the place of a traditional trifold board.

Expectations:

- Font style, size, and color must be clear and easy to read from a computer screen.
- Style adjustments to the slide templates are allowed. (Such as changing to columns general layout, etc.)
- Please remove slides 1 and 2 before you submit your saved presentation
- Use appropriate images and or videos throughout the presentation to demonstrate your work.
    - Be sure to properly cite all your posted images.

# Your Title

Your name
School
Grade

# Abstract:

1 paragraph (250 words limit) summary of your project research

This should be completed once you have fully completed your research and drawn your conclusions.

# Research Question

# Background Research

Short essay researching background information on your topic prior to beginning your project. All sources should be properly cited and recorded on the Works Cited/Bibliography slide.

# Hypothesis

# Materials

- This should be in list format
- Remember to include quantities and sizes. (metric units if applicable)
- If working from collected data include the source of the data (website etc.)

# Procedures

Clear outline of your procedures

1. Procedures are typically a step by step, numbered list, of how your trials were conducted.
2. It must be repeatable
3. You may make this slide into two columns if needed. (Slide>Apply Layout> Title and two columns)
4. Adjust your font size accordingly
5. Must be clear and easy to read.

# Data

Insert your data tables here.

# Data Analysis

Discussion of results

# Data Analysis

Graphs and charts

# Conclusion

Type your conclusion here.

# Future Research  possibilities

# Works Cited/Bibliography