SOUTHEASTERN MICHIGAN JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM

RESEARCH PAPER GUIDELINES

Acknowledgement: This handout was prepared using information from the Illinois Junior Science and Humanities Symposium and available at: http://www.science.siu.edu/ijshs/pdf/ijshs.pdf

Overview: The research paper is a written report describing original research results in science, mathematics, or engineering. The paper should rely on previously published literature primarily for background and comparative purposes.

Organization of Research Paper: Your paper should be organized as follows:

- Title page, or cover page
- Abstract
- Acknowledgments
- Table of contents
- List of tables and/or list of figures
- Introduction
- Materials and methods
- Results
- Discussion and conclusions
- References, or literature cited
- Appendices (optional)

Title Page: A short statement related to the content of the paper.

Abstract: The abstract is a brief summary of the various aspects of the paper. The abstract should be about 200 words long, written in the past tense, and provide a brief overview in paragraph form of the following areas of the paper:

- The purpose of the research or the research problem,
- A general overview of how the problem was studied,
- The principal findings and conclusions.

Acknowledgements: The acknowledgments section is a short paragraph where the researcher describes the contributions of others to the research study (contribution of ideas, materials, procedures, analysis of data, etc.).

Table of Contents: The Table of Contents provides an outline that indicates the page location of the sections and subsections of the paper.

List of Tables and a List of Figures: Indicate the location of any tables or figures in the paper.

When making a List of Tables, include:

- table numbers,
- titles, and
- page numbers.
When making a List of Figures, include:
- figure numbers,
- captions, and
- page numbers.

Introduction: The introduction provides background on the topic related to your research project, including the problem and the reason why you examined that topic. The introduction should provide sufficient information on the topic, using the literature that you read, so that the reader can understand your research project. The introduction should include the following:

- A brief literature review. Cite and discuss previous research from relevant literature, and state how your research relates to or differs from others' work;
- The rationale for your study. Why did you choose that subject, and why is it important? And a simple statement of the most important point(s) that you will address in your paper;
- The research question(s) and hypothesis related to each research question.

Methods and Materials: This section should be written in paragraph form and describe how you conducted your study; what materials and equipment you used, and what methods or procedures you followed.

Results: The results section contains all the major experimental findings of the study and their statistical analyses, presented in a logical order with text and visuals such as tables, graphs, diagrams that complement and supplement the other. The results section should include the following:

- Visuals (tables, figures, and/or illustrations) where necessary for clarity and conciseness,
- Text that summarizes the data collected and points out highlights of visuals, and
- Any appropriate statistical analyses of the data.

Discussion and Conclusions: This section provides an analysis of your results. It is a concise discussion of your most important results in the context of other peoples’ work (as reported in the Introduction) and the conclusions drawn based on your research findings (as reported in the Results). Include the following in this section of your paper:

- Briefly restate your hypotheses; explain how your data either supports or rejects your hypothesis related to each research question;
- Show how your results agree (or contrast) with previously published work (include appropriate literature citations);
- State your conclusions as clearly as possible; summarize your evidence for each conclusion;
- Acknowledge any limitations which affect the results; discuss any other factors over which you had no control; explain their possible effect on study outcomes;
- Include suggestions for procedural improvements, if applicable;
- Discuss any theoretical implications or practical applications of your work; and
- Make recommendations for future research.

Reference List: Provide a complete list, organized in alphabetical order, of all information referenced in the paper.
Appendices: Appendices contain supplemental information such as lists of terms, definitions, and questionnaires that are useful but not essential to the body of the research paper.

Writing and Proofreading: Writing well is a laborious process of writing, reading, rewriting, and repeating these steps many times. Make sure after you write the first draft of your paper you go over it again a day or two later. Give it to someone else for feedback in clarity of ideas and writing style. Keep in mind the following when proofreading your paper:

- Use third person in grammar, when possible.
- Examine the verb tenses throughout your paper.
  - Present and past tenses may be used in the Introduction.
  - Past tense or present perfect tense (researchers have shown) is appropriate for the literature review and the description of the Materials and Methods.
  - Use past tense to describe your Results.
  - Use the present tense for the Discussion and Conclusions. The present tense allows your readers to join you in your consideration of the matter at hand.
- Examine your use of pronouns, especially "it." Is the meaning clear?
- Examine your sentences for needless words.

**For additional suggestions on how to prepare your paper, visit:**
http://www.science.siu.edu/ijshs/pdf/ijshs.pdf

Other things to keep in mind:

- The paper must be typed, double-spaced, on one side only, using 8 1/2 x 11" paper with one-inch margins. Pages should be numbered.

- All experiments with animals (especially vertebrates) must provide evidence that the attached "Guiding Principles in the Use of Animals" was followed. (see information below)

- On the Student Application to Present Research Paper make sure you circle the category in which you wish to compete.

- Students must fill out and submit the following forms: Student Application form, Parent Consent Form, and Student Nomination form.

Send your abstract and paper attached to email to Dr. Maria Ferreira (m.ferreira@wayne.edu)

Criteria for judging the papers: The criteria use to select the papers for presentation are listed below, after guidelines in the use of animals.
GUIDING PRINCIPLES IN THE USE OF ANIMALS

BY SECONDARY SCHOOL STUDENTS AND SCIENCE CLUB MEMBERS

1. The basic aim of scientific studies that involve animals is to achieve an understanding of life, and to advance our knowledge of life processes. Such studies lead to a respect for life.

2. A qualified adult supervisor must assume primary responsibility for the purposes and conditions of any experiment that involves living animals.

3. No experiment should be undertaken that involves anesthetic drugs, surgical procedures, pathogenic organisms, toxicological products, carcinogens, or radiation unless a trained biological scientist, physician, dentist, or veterinarian directly supervises the experiment.

4. Any experiment must be performed with the animal under appropriate anesthesia if pain is involved.

5. The comfort of the animal used in any study shall be of prime concern of the student investigator. Gentle handling, proper feeding, and provision of appropriate sanitary quarters shall at all times be strictly observed. Any experiment in nutritional deficiency may proceed only to the point where symptoms of the deficiency appear. Appropriate measures shall then be taken to correct the deficiency, if such action is feasible.

CRITERIA FOR SELECTION OF STUDENT RESEARCH PAPERS FOR PRESENTATION AT THE SYMPOSIUM

1. Originality and Creativity of High School Student:
   - Originality in choice of project
   - Creative approach to use of materials
   - Use of novel and unique methods and techniques
   - Evidence of purposefulness and persistence of effort

2. Quality of Research Design:
   - Clarity of statement and delineation of problem
   - Adequate identification of relevant variables
   - Suitability of hypotheses or research questions
- Adequacy of approach and methods used to study problem

3. Adequacy of Data, Analysis, and Conclusions:

- Evidence of accurate observations
- Adequacy of display of data and the procedures used to analyze this data
- Validity of conclusions
- Recognition of limitations in accuracy and in the evaluation of the significance of the data

4. Scope of Thought:

- Depth of scientific understanding of scientific principles and methods
- Evidence of a sequence of thought proceeding logically to a conclusion
- Readability and clarity
- Adequacy of overall organization of research project

5. References:

- Adequate and relevant research and scientific publications
- Attempts were made to examine primary sources of data where possible

These criteria are used for the initial selection of the 25-30 student papers to be presented at our Symposium. Individual papers are evaluated on their individual merit, not in comparison with other papers. At the Symposium, these areas of your research project will be evaluated again, combined with your stage presence and delivery as well as skill in answering questions from the judges and audience.