HOW TO APPLY FOR

HSRS

Everything you need to know to submit a successful application for the High School Research Symposium!

Updated Fall 2025

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Section 1: Overview

What is the High School Research Symposium?

The High School Research Symposium (HSRS) is an academic research competition where high school students from Iowa and the surrounding areas present their original research to peers, educators, and judges. Any student in grades 9-12 can submit a research proposal paper in one of the categories listed below. Students need not any prior research experience – just the enthusiasm to learn!

Benefits of Competing in HSRS

The Belin-Blank Center will award the following to oral presentation winners:

- $4,000 first-year University of Iowa scholarship to first place
- $3,000 first-year University of Iowa scholarship to second place
- $2,000 first-year University of Iowa scholarship to third place

The top poster presentation winner will receive:

- $1,000 first-year University of Iowa scholarship

Still not convinced? Here are even more reasons to apply for HSRS:

- Meet like-minded peers
- Boost your college application
- Hear nationally-renowned scientists speak on their work
- Improve your public speaking skills, whether delivering an oral presentation on stage or a poster presentation to a small audience
- Improve your organization and time-management skills
- Develop scientific research skills to ultimately prepare for undergraduate and graduate-level research pursuits

Attending the High School Research Symposium

All high school students in interested in science are encouraged to attend the competition along with science educators from the region.

There is currently no fee to attend the HSRS. Lunch is included during the one-day symposium. Please note that school districts and/or students are responsible for all other expenses.

Teachers, mentors, and students must register for the event prior to the deadline in order to attend. All forms and deadlines are available at belinblank.org/hsrs.

Section 2: Getting Started

STEP 1: Narrow down a topic

HSRS applicants can submit research proposal papers whose subjects fall within one of the following domains:

- **Environmental Science/Engineering** (Bioremediation, Ecosystems Management, Environmental Engineering, Land Resource Management, Pollution, Ecosystem Impact of Toxicity)
- **Biomedical Sciences & Cell/Molecular Biology** (Biomedical Medicine, Microbiology, Molecular/Cellular Biology, Genetics, Immunology, Pharmacology, Virology)
- **Life Sciences** (Developmental Biology, Plant Physiology, Population Genetics, General Biochemistry, Microbiology)
- **Medicine and Health/Behavioral Sciences** (Behavioral Sciences, Biochemistry, Bioengineering, Disease Diagnostics & Treatment, Epidemiology, Immunology, Neuroscience, Physiology, Pathology)
- **Engineering and Technology** (Aerospace, Aerodynamics, Electrical Engineering, Solar Energy, Vehicle Development, Devices, Mechanical Engineering, Robotics, Internet of Things)

- **Mathematics, Computer Science, and Computer Engineering** (Probability & Statistics, Math, Computer Algorithms, Databases, Networking, Computer Engineering)
- **Physical Sciences** (Astronomy, Theoretical Physics, Solid State Physics, Acoustics, Optics, Thermodynamics, Particle Physics, Quantum Physics, Nuclear Physics)
- **Chemistry** (Physical Chemistry, Organic Chemistry, Material Science, Alternative Fuels and Geochemistry, Chemical Engineering, Earth Science, Energy)

Often HSRS applicants find multiple of the listed domains to be fascinating – but consider letting your specific research topic choose *you* and not the other way around. Do you have a burning question to which you'd like to seek out answers? Is there a topic within STEM that particularly means a lot to you on which you feel like you could present?

STEP 2: Find a mentor

Students who participate in HSRS must do so under the guidance of a mentor who can assist them through the process. Don't be afraid of requesting guidance from your teachers — high school student research is exciting and they want you to support you however they can.

STEP 3: Do your research

Consider checking out the following open-source databases to help you get started:

- **Astrological data from the Mikulski Archive for Space Telescopes**
- **Climate data from the National Climatic Data Center**
- **Geographical, astrological, and wildlife data from Citizen Science**
- **Geographical data from the National Geographical Data Center**
- **Iowa flood data from the Iowa Flood Center**
- **NASA Open Data Portal**
- **Water data from the United State Geological Survey**

Google Scholar and Wikipedia references can also be helpful!

STEP 4: Time to delve into... drumroll please... the research paper!

Section 3: The Research Paper

Paper Overview

All applicants must submit a research proposal paper abiding by the following guidelines:

- Graphs, tables, diagrams, charts, or other graphical representations should be large enough and simple enough to allow the judges to view them from the electronic file submitted.
- Electronic research paper submission should not exceed 1.8 Mb.
- Research paper submissions should be a minimum of 5-6 pages and a maximum of 20 pages, including appendices. The title page, abstract, acknowledgements, use of non-human vertebrates or human subjects statement, and table of contents do not apply to page count.
- Page numbers should be placed at the bottom of each page.
    - Papers must have 1-inch margins and must be double-spaced in a 10 or 12-point Times or Times New Roman font.
    - Research Papers should be written in APA style; **here** is an overview, and **here** you can see an example paper.

Paper Sections

A. Title Page

- The title page states the researcher's name, research title, and the researcher's school and school address. Scientific titles ought to be concise, descriptive, and informative. A tutorial for writing a title page in APA style can be found **here**.
- When writing a title:
- Do not write the title as a question
- Do not use abbreviations
- Avoid "a", "an", or "the", or phrases such as "a study of" or "an investigation of"
- Be specific, but not verbose – a two- or three-word title may be too short, but a 14- or 15- word title is likely too wordy
- Keep it boring: Scientific writing is not creative writing nor advertising

Example of a Title Page

[Title of Paper]

Title of Paper

First Name, Middle Initial, Last Name

Name of School

City, State

Name of Research Advisor

Date

B. Abstract

An abstract gives a summary of the research paper. The abstract should accurately convey the essential nature of the research conducted and the most significant conclusions reached. The abstract should attract the interest and curiosity of the non-specialist reader and thus encourage exchange, discussion, and

elaboration between various authors and between authors and readers. A tutorial about how to write an abstract in APA format can be found **here**.

- The abstract must include a heading with the following information:
- Title of the research
- Your name
- Name of your high school, high school city, and state
- Name of your teacher/sponsor/mentor and their organization. Precede their name with a subheading (i.e. teacher, mentor, sponsor)

The abstract itself must abide by the following parameters:

- One line of space between the heading and the body of the abstract
- Single-spaced
- Clearly state the researcher's major research discipline and sub-discipline
- It must not be more than 200 words

Begin with the most important information, but do not repeat the paper title. Include only information that appears in the paper itself.

State important hypotheses, theories, and other background information relating to your study. Summarize the most important findings of your study.

Example of an Abstract

Abstract

Begin with the most important information, but do not repeat the paper title. Include only information that appears in the paper itself. State important theories and background information relating to your study. Summarize the most important findings of your study. Do not exceed 200 words.

Abstracts are published as submitted and distributed to all symposium attendees.

C. Acknowledgement of major assistance received

If you received significant help in thinking up, designing, or carrying out your research, or if you received materials from

someone, you must acknowledge their assistance and the service and/or the material(s) provided.

D. Disclosure statement of usage of non-human vertebrates or human subjects

As applicable, include the following statement: "Research involving non-human vertebrates or human subjects was conducted under the supervision of an experienced teacher or researcher and followed state and federal regulatory guidance applicable to the humane and ethical conduct of such research."

E. Table of Contents

The table of contents should serve as a resource for your readers, providing them with an overview of what will be found in the paper and enabling them to quickly locate sections.

The table of contents should include:

- A list of all the section titles included in the paper
- Page numbers associated with each of the sections of the paper

Example of a Table of Contents

Table of Contents

A tutorial of how to write a table of contents in APA can be found **here**.

F. Introduction

The introduction provides background and rationale for the research. You should address the questions you researched and provide your readers with an understanding of the path you took to address the problem. While composing your introduction, follow the sequence below:

1. **Describe the problem:** Why does the topic need to be studied?
2. **State your hypothesis:** What do you hope to conclude from your experiment?
3. **Entity to be studied:** Common problems and issues
4. **Independent variable:** What variable did you manipulate, why did you choose to manipulate this variable, and what considerations had to be made in order to accurately and safely manipulate this variable?
5. **Dependent variable:** What variable did you measure in response to the independent variable and why was this variable beneficial to study?
6. **Methods:** Explain the ways you conducted the experiment and justify the quantitative and qualitative data collection methods you used
7. **Citations**

G. Materials and Methods

The Materials and Methods section is a narrative used to give the procedural details of your experiment, in such a way that another researcher could repeat your experiment by following what you wrote. It should describe how you conducted the study, what equipment and techniques you used, what procedures you followed, and the difference between the control and experimental groups. In this section be sure to include:

Statement of your hypothesis (your hypothesis should be written as a testable statement or question and include the IV, DV, and predictions that can be supported or rejected)

- Overview of each item used in your experiment
- Explanation of how the project data will be collected and measured (including units)
- Explanation of how the independent variable changed
- Descriptions of statistical or graphical analyses performed on your data
- Descriptions of any surveys, assessments, etc. used in your research
- Any photos of your experimental setup or data collection procedures, including appropriate titles for each figure

A tutorial for how to write a methods section in APA format can be found **here**.

H. Results

The results section should include the experimental evidence from your study, both qualitative and quantitative, and should be written in past tense. It is important to present the data from your research, but to refrain from interpreting or discussing its significance (interpretation of your data should be found in the discussion section). You should directly compare the data from various groups, if applicable. Be sure to report your data, most frequently organized into tables or figures with appropriate labels, only once.

I. Tables and Figures

Tables and figures should:

- Be constructed so they stand alone
- Have a title, labels, and figure legend
- Appear in chronological order in which you refer to them
- Clearly report data so readers can quickly draw conclusions

A tutorial for how to make graphs in APA style can be found **here**.

Example of a Table

Table 1

Title of Table

Header	Column Head	Column Head
Category 1	Score	Score
Category 2	Score	Score
Category 3	Score	Score

Note: As necessary, include additional information needed to interpret your table.

Within the results section, you should provide a brief narrative presenting additional data, if necessary, and explain the figures and tables presented.

Here is a tutorial for tables in APA style.

II. Statistical Analyses

If you conducted statistical analysis on your data, those results need to be reported in this section. An overview of the statistical analysis should include:

- Name of statistical test used and/or the mathematical computations performed
- Explanation of how you prepared the data for analysis
- Test statistics
- Degrees of freedom and/or sample size
- Significance level
- Probability value

As necessary, it may be useful to display statistical evidence to support your findings. There are two types of statistics presented in a research paper: descriptive statistics, and inferential statistics.

a. Descriptive Statistics

Descriptive Statistics describe the most typical values and the variations that exist within a data set (Salkind, 2008). A data set refers to numerical data that is recorded to represent the results of an experiment. Descriptive data is most commonly presented in terms of:

Measures of central tendency. These measures describe the central position of the distribution of scores in a dataset. The measures of central tendency are, mean, median, and mode.

b. Measures of variation. These measures describe the distance between scores in a dataset. The measures of spread are range, interquartile range, variance, and standard deviation.

b. Inferential Statistics

Inferential Statistics are mathematical calculations performed to determine whether the differences between groups are due to change or are a result of a treatment (Cothron, Giese, & Rezba, 2006). That is, inferential statistics determine whether or not the effects of your experiment are statistically significant. Results are deemed statistically significant when the mathematical differences between groups are more likely due to the change of the independent variable than to luck or chance (Statistics, 2011). There are many different ways to calculate inferential statistics, including:

- Linear regression analyses
- Logistic regression analyses
- Analyses of variance (ANOVA)

- Correlation analyses
- T-tests
- Longitudinal data analysis
- Survival analyses

Here is a tutorial to help you understand descriptive and inferential statistics.

I. Discussion

In the discussion section, you should interpret the results from your research, draw conclusions from your data, and suggest further hypotheses that can be tested based on any discrepancies or ambiguities found. The discussion section should:

- Restate the importance of your scientific research
- Declare whether your hypothesis was supported, not supported, or partially supported
- State whether your results were expected and explain why or why not
- List and explain possible explanations for your results
- Discuss the limitations of the study and provide suggestions for how future research on this topic could be improved

- Relate your research to work previously completed by others in the field

Each paragraph in the discussion section should address one aspect of the explanation of the results. For each paragraph, a topic sentence should be included that tells readers what will be discussed. This section will be used to restate your results, during which, you can refer the reader back to the tables and figures you provided in the results section.

When explaining your results:

- Avoid using words such as: obviously, clearly, or proves
- Discuss, when appropriate, any groups that had irregular results compared to the other groups
- Address any foreseeable questions regarding your research
- Mention possible explanations for trends and patterns reported in the results section

J. Conclusion

The conclusion section should connect back to your introduction and explain whether your research provided any answers to your original research question. The conclusion section should:

- Include possible applications and extensions of your research
- Describe research studies that could be completed in the future
- Connect the research to possible real-world applications
- Apply the results of your experiment to the scientific community, including the scientific knowledge you've contributed in response to your research
- Discuss new questions that emerged from your study

The last paragraph of the conclusion section should summarize your analysis, declaring the degree to which your results show a relationship between the independent and dependent variables. Here, you will need to explain how that final conclusion was made and briefly support your conclusion with evidence.

K. References or Literature Cited

Please see video tutorials for research paper construction in APA format style or consult the *Publication Manual of the American Psychological Association: 7th Edition* (APA, 2019).

Virtually all scientific papers rely to some degree on previously published work. When a fact or an idea is borrowed (whether directly or paraphrased) from another source, it must be acknowledged, or cited, in the text and the origin of the information must be revealed.

It is important to give credit to sources for the ideas and information they provided you in the conduction of your research. Taking credit for someone else's work, ideas, or findings is plagiarism and is considered unethical in the scientific community.

Resources allow readers to verify the validity of your claims and gather additional information if they so choose. As with conventional scientific writing, you will be using embedded references. In doing so, you will cite your sources in the text of your research paper using APA style of documentation.

The research paper should:

- Include in-text citations for ideas or quotations that came from other sources
- Contain information from reliable sources only

- Ensure that all entries in the References section at the end of the paper are correctly formatted and are listed in alphabetical order

HSRS will use the "Author, Date" scientific style for references. Rules for the most common works cited are listed below.

- Mention the author by last name in the sentence and then give the year of the publication in parenthesis:

  According to Smith (2024), atomic structure is difficult for middle school students to understand.

- Give the facts or ideas mentioned by the author and then attribute these facts or ideas by putting both his or her last name and the date in parenthesis:

  Atomic structure is a difficult concept for middle school students to understand (Smith, 2024).

- Quote the author exactly-be sure to put the quoted phrase between quotation marks--and then list the author's name, the date, and the page number in parenthesis:

  "Students in middle school experience difficulty understanding atomic structure." (Smith, 2024, p. 9).

You only need to include the page number in the citation if you are quoting directly, or if the source is very long and the specific fact or idea you are citing can only be found on a specific page. Direct quotations that are more than 4 lines long should be set off from the rest of your paper by use of narrower margins and single-spaced lines.

If you have more than one source by the same author published in the same year, distinguish them both in the in-text citation and in the reference list, by appending the letters a, b, c... to the year, in the order in which the different references appear in your paper. (For example: Jones 2017a, 2017b)

- If the reference you are citing has two authors, use the following format:

  HSRS is an outstanding program for emerging young scientists. (Flynn and Keller-Wilson, 2025).

- If the reference you are citing has more than two authors, use the following format:

HSRS is an outstanding program for emerging young scientists. (Keller-Wilson et al., 2025).

- If your source of information is from a personal verbal communication, use the following format for the first citation from that person:

  Students in middle school experience difficulty understanding atomic structure (Leslie Flynn, University of Iowa, personal communication).

- If your source of information is from written correspondence (a letter or e-mail), substitute the word "written" for the word "personal" above, and add the date of the letter (if dated). Personal communications are generally not included in the References Cited or Bibliography section, although unpublished papers, reports, or manuscripts should be.

- For internet sources without any identifiable author or date, use the URL address as the in-text citation: ie: *HSRS will be held in Iowa City, Iowa. (education.uiowa.edu/belinblank/Students/HSRS/).*

Here is a tutorial for how to cite resources and create a reference list in APA 7th Edition.

L. Appendices

Appendices are optional and function to provide additional information. Information contained within the appendices provide further clarification that is otherwise non-essential in understanding the paper itself.

Each appendix should be identified by sequential Roman numerals and contain different materials. The following are examples of what you might find in an appendix:

- Raw data
- Figures and tables
- Maps
- Photographs
- Explanation of formulas and/or statistical tests used

Any data you provide in your results section should not be included in an appendix. Visit the official APA handbook's website to learn more about appendices.

Miscellaneous

Timeliness Reminder

Late or incomplete research papers will not be reviewed – unfortunately, we cannot grant extensions.

Contact us

- Please email students@belinblank.org with any questions or concerns!

Thank you to everyone who has made the High School Research Symposium possible!

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Belin-Blank Center