



46th Georgia Junior Science & Humanities Symposium

The University of Georgia
February 28 – March 2, 2021

RULES & GUIDELINES

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UPDATE EFFECTIVE 12.01.20 - PLEASE READ:

Applicants must enter their Abstract as text directly in the online GJS&HS application. The Research Paper may, but is not required to, contain the Abstract. (Versions 1 and 2 of these Rules & Guidelines stated that the Abstract and Research Plan must be uploaded as a single PDF document.)

Office of Academic Special Programs

Phone: (706) 542-6473 / Email: osp@georgiacenter.uga.edu

Applications available online - www.georgiacenter.uga.edu/gjshs

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The information contained in this rulebook is adapted from materials available at www.jshs.org. Please visit www.jshs.org for updated information about the National Junior Science & Humanities Symposium.

Important Dates

January 8, 2021	Deadline for submission of the Intent to Participate Form for all students intending to submit an application for the 2021 GJSHS
January 17, 2021	Deadline for submission of the online GJSHS application and research paper (to be uploaded to the online application)
February 12, 2021	Approximate date the list of selected GJSHS participants will be posted on the GJSHS website at http://www.georgiacenter.uga.edu/gjshs
February 28 - March 2, 2021	Virtual Georgia Junior Science & Humanities Symposium Hosted by the University of Georgia Center for Continuing Education
April/May 2021	59 th National Junior Science & Humanities Symposium (Virtual)

About the Junior Science & Humanities Symposia

Junior Science and Humanities Symposium (JSHS) is a Tri-Service sponsored STEM competition for high school students enrolled in grades 9-12 who engage in research investigations in the sciences, technology, engineering or mathematics (STEM). Students are invited to compete in an affiliated JSHS regional symposium and may win the opportunity to advance to the National JSHS.

The primary aims of JSHS are to promote original research and experimentation in the sciences, engineering, and mathematics at the high school level, and to publicly recognize students for outstanding achievement. By involving talented students and their teachers in affiliated symposia, and by recognizing students' research endeavors through scholarships and other awards, JSHS aims to encourage continued interest and participation in the sciences and ultimately to widen the pool of trained scientific and engineering talent prepared to conduct research and development vital to our nation.

Sponsorship

The Junior Science and Humanities Symposia (JSHS) program has been sponsored by the United States Department of the Army since its inception in 1958, and additionally joined by the Departments of the Navy and Air Force after 1995. Resulting from this sponsorship and the cooperative efforts of universities throughout the nation, JSHS encompasses forty-eight regional symposia reaching high schools throughout the United States, Puerto Rico, and in cooperation with the Department of Defense Schools of Europe and the Pacific, and the annual National JSHS.

The National Science Teachers Association, headquartered in Arlington, Virginia, administers the National JSHS Program in cooperation with universities or other educational institutions.

The Georgia Junior Science and Humanities Symposium (GJSHS) is administered by the University of Georgia's Office of Academic Special Programs. It is a program in which high school students present and defend original scientific research. Eighth grade students are typically invited to submit their work for selection in the poster presentation category, but this option will not be available for the 2021 GJSHS.

Objectives

<i>Promote</i>	research and experimentation in the sciences, mathematics, and engineering at the high school level.
<i>Recognize</i>	the significance of research in human affairs, and the importance of humane and ethical principles in the application of research results.
<i>Search out</i>	talented youth and their teachers, recognize their accomplishments at symposia, and encourage their continued interest and participation in the sciences, mathematics, and engineering.
<i>Expand</i>	the horizons of research-oriented students by exposing them to opportunities in the academic, industrial, and governmental communities.
<i>Increase</i>	the number of adults capable of conducting research and development.

Why Participate?

At regional and national symposia, students and their teachers may...

- Gain self-confidence not only through the experience of the research investigation but also through networking among participants with similar interests
- Participate in a forum honoring exceptional work and encouraging personal and academic growth.
- Participate in a scientific conference, take field trips, and have their work published.
- Have an opportunity for laboratory and/or campus visits
- Interact with practicing researchers who offer a look beyond high school to opportunities in post-secondary education and to academic and career development in the sciences, engineering, and mathematics, and presentations by guest speakers
- Develop higher-order thinking skills and integrated learning across disciplines through the process of scientific inquiry, writing a scientific paper, and delivering a presentation - all skills that will benefit future post-secondary and graduate pursuits.

Awards

Significant awards are available to JSHS regional and national student finalists. University-contributed scholarships or other awards are sponsored by many regional symposia. The availability of these additional awards, type of award, and value vary by region. The Departments of the Army, Navy, and Air Force jointly sponsor the following awards (subject to the availability and release of government funding):

For students who participate in regional and national symposia...

- Public recognition and certificates, honoring achievement and interest in research pursuits
- Attain a sense of achievement and self-confidence resulting from interaction with students from other schools and regions and with professional researchers and educators. To quote a former JSHS alumnus, [At JSHS] "I learned a tremendous amount of science, got to meet other high school students who shared my interests in science, and learned that I could succeed at any program that I chose to pursue."

For teachers...

- ***\$500 in awards*** to teachers at each of the Regional symposia, honoring the individual teacher and their school's contributions to advancing student participation in research.

For the regional finalists...

- ***An expense-paid trip to the National JSHS***, awarded to five finalists at each regional symposium. The National brings together over 360 participants in a program of educational and scientific exchange.
- ***An invitation to present their original research investigation at the National JSHS***, awarded to two finalists at each regional symposium.
- ***A total \$4,500 undergraduate, tuition scholarships***, awarded at \$2000, \$1500, and \$1000 to each of three regional symposium finalists. (scholarship payable upon matriculation and upon meeting the JSHS scholarship conditions)

For the national finalists...

- ***\$12,000 undergraduate, tuition scholarships***, awarded to each of the 1st place finalists in the National JSHS competition.
- ***\$8,000 undergraduate, tuition scholarships***, awarded to each of the 2nd place finalists in the National JSHS competition.
- ***\$4,000 undergraduate, tuition scholarships***, awarded to each of the 3rd place finalists in the National JSHS competition.

The Georgia Regional Symposium (GJSHS)

Georgia JSHS invites high school students who have completed an original research investigation in the sciences, engineering, or mathematics and who meet the eligibility requirements below to apply.

Note: In previous years, GJSHS has selected additional students in grades 8-12 to participate as symposium Observers (as opposed to Presenters) and to exhibit their research in a poster competition. Due to the unusual circumstances of COVID-19, only students in grades 9-12 will be eligible to apply to the 2021 GJSHS, and all selected participants will be Presenters.

Eligibility

1. Students may compete in only one regional symposium. The 2021 Georgia JSBS is open to students in grades 9-12 who are enrolled in a public, private, or home school located in the state of Georgia.
2. **Citizenship:** Students must be a citizen or permanent resident of the United States or U.S. territory to participate in JSBS.
3. **Continuation Projects:** Students may continue a research investigation; however, a study which merely adds data from a previous year's project is not considered a strong continuation project. If a continuation project is submitted, the student must discuss how the project was expanded (i.e. methodology, new variables); discuss any revisions in experimentation and present new data.
4. **Team Projects:** A student may present a report on work done as part of a class project, or as a science fair project, or summer research project. If a presenter is part of a larger group, the presentation should focus on the coordinated efforts of all team members and properly acknowledge the contributions of the team (i.e. students, mentors, and/or teachers). A team leader should be selected to register and present the results of the group work. The research may not be presented by any other member of the team. The judging criteria used to judge all JSBS presentations remains the same.
5. **Team Projects Awards:** If an individual presenter from a group project is selected as a Regional finalist and is invited to present at the National JSBS, the same presenter must present at the National Symposium. Scholarships and other awards available at Regional and National Symposia are awarded to the presenter.
6. Projects that are demonstrations, 'library' research or informational projects are not appropriate for JSBS.
7. The date/time for the student's presentation is determined by regional and national symposia leadership. A student must be present for the assigned time or risk disqualification.

Application and Selection Processes

Students are selected to attend Georgia JSBS after a preliminary judging process of their research papers. Based on the results of this preliminary review, **40 to 50** Georgia students in grades 9-12 will be selected to participate in the oral presentation competition at the virtual Georgia JSBS. GJSBS culminates with the selection of five (5) of these presenters to win an expense-paid trip to National JSBS. Two (2) of these five finalists will have the opportunity to present their research and in the oral presentation competition at NJSBS, and one (1) will be invited to enter the NJSBS poster competition. [Subject to change as circumstances related to the pandemic unfold.]

1. Students will complete online registration and application materials for GJSBS. **A link to the online application system will be available on December 1, 2020 at www.georgiacenter.uga.edu/gjsbs.**
2. As part of the online application, students will upload a written **Abstract, Research Paper, and Statement on Outside Assistance** prepared in accordance with GJSBS guidelines (see pages 7-10).
3. Preliminary judges will read and score papers.
4. 40 to 50 presenters will be selected; selections will be posted on the GJSBS website on February 12 (approximately).

5. At the virtual GJSHS February 28 – March 2, 2021, presenters will deliver a concise oral presentation to a panel of judges.
6. Based on the GJSHS presentations, presenters may be selected for awards and/or to attend the National JSHS competition.

The submitted written reports and oral presentations should present the results of original research carried out by the student. Students are encouraged to obtain assistance from teachers, mentors, parents, or other students. How can students best demonstrate original work? Through oral and written research presentations made at JSHS, students report on their unique, innovative, and creative contributions to the research problem and their approach to undertaking the investigation. Students must also demonstrate their understanding of the scientific principles underlying the research problem.

All applicants must comply with regional and national rules and policies that apply to the preparation of the written reports and the oral presentations.

Materials Required for Entry: INTENT TO PARTICIPATE FORM

Students who intend to submit a paper for consideration for the 2021 Georgia JSHS must submit the [Intent to Participate Form](#) by Friday, January 8, 2021. No project materials will be due at this time; students may continue working on abstracts and papers until the application deadline of Sunday, January 17, 2021. *(Submission of form is requested for planning and judge recruitment purposes and is not binding.)*

Materials Required for Entry: ABSTRACT

The Abstract will be entered into the online application as text. *(Note this is different from previous years, when the Abstract and Research Paper were required to be combined into a single PDF. For the 2021 GJSHS, the Abstract is not required to be a part of the Research Paper.)* Deadline for submission of all materials is January 17, 2021.

The Abstract may be copied-and-pasted from a Word or other word processing document; students should review the entered text carefully to ensure the text transferred properly.

Abstracts should be prepared to serve the following purposes:

1. To enable the reader to decide whether the topic is of sufficient interest to warrant taking the time to read the entire paper or going to hear the presentation; and
2. To acquaint the reader with recent research results in a concise manner.

ABSTRACT REQUIREMENTS

Please read carefully before preparing your abstract.

1. An abstract is a **summary** of the research written in narrative (story) form. It is not merely a general description about the research.
2. Maximum 250 words.

3. Should include the following elements, written in narrative form without subtitles:
 - a. The **title** should be brief and descriptive.
 - b. The **statement of the problem** tells the reader what specific questions are addressed in the study. The variables and limitations are identified. The intent and objectives of the research effort are made explicit in this statement.
 - c. The **purpose** states the usefulness of the study. It answers the question as to why the project was undertaken.
 - d. The **hypothesis** is an educated guess that shows the relationship between a set of observed facts and a theory. The hypothesis limits the scope of the investigation and unifies the research design. **Please note that engineering, math, computer science, and sometimes physics projects do not have a hypothesis.**
 - e. The **procedure** provides a brief summary of what was done.
 - f. The **conclusions** provide a concise statement of the outcomes of the investigation. They should be written in non-technical language and be related directly to the hypothesis. The conclusions should identify unsolved aspects of the original problem or any new problems identified.

There is no "standard" or required arrangement for the parts of an abstract (although format listed above is recommended). Its statements may be in any sequence that enables the most information to be conveyed in the fewest words. Its sequence can be, and frequently is, totally different from that of the paper. A good abstract is usually drafted and re-drafted, eliminating, adding, or rearranging words. Financial sponsorship mentioned in the paper must be concisely credited in the abstract: "Research supported by ..." **Note: This is different from science fair rules.*

Materials Required for Entry: RESEARCH PAPER

Research Paper should be uploaded to the student's online application *as a PDF document* (see guidelines below). Deadline for submission of all materials is January 17, 2021.

The Research Paper details the original scientific research and should generally follow "best practices" in the field. Work must be that of the student, not the mentor.

RESEARCH PAPER REQUIREMENTS

Please read carefully before preparing your research paper.

1. Must be typed in **12-point Times New Roman or Calibri font**.
2. Must be **double-spaced**. *Note: Students who are selected to advance to the National JSHS will be asked to resubmit the research paper after the Georgia JSHS and prior to the National JSHS. The resubmitted paper may be a maximum of 20 pages **single-spaced**; however, the research paper submitted for competition at the Georgia JSHS must be a **maximum of 20 pages double-spaced**.*
3. Must use **1-inch margins**.

4. Must be minimum of 6 pages and **maximum of 20 pages** (includes ALL paper components, including title page, table of contents, works cited, appendices, etc.).

RESEARCH PAPERS EXCEEDING 20 PAGES WILL BE DISQUALIFIED.

5. Must be submitted as **PDF**. Please double-check formatting of images, tables, page numbering, etc. before submission to ensure distortion did not occur during PDF conversion.

6. **The following elements and format are recommended:**

- a. TITLE PAGE - The cover page must contain the title of the research, category, student's name, school, and school address. Make sure your title is concise but also descriptive.
- b. TABLE OF CONTENTS - List the topics and sub-topics in order and the page numbers on which they start. Include a list of all graphs, tables, and other representative figures. Each figure should have a title and page number.
- c. INTRODUCTION - Write the introduction to provide background details or the setting of your specific research problem. Assume that the reader will be scientifically literate, but he or she may not be familiar with the details. State the purpose of the research study early in the introduction, and then state the hypotheses that you are testing. Describe what is already known about the research.
- d. MATERIALS, METHODS, AND PROCEDURES - State the materials, methods, or procedures used to conduct the research in a step-by-step manner. This section should be written specifically enough so that the research could be replicated.
- e. RESULTS (DATA OR FINDINGS) - Present the results of your research finding in logical order. Use graphs, tables, and/or other representations. Tables and graphs should be numbered separately and should include captions. Numbering will enable you to refer to them in the body of your paper quite easily. Explain in your paper the important features of each table, graph, etc. Report the results of statistical analyses of your data and the type of statistical tests used.
- f. DISCUSSION AND CONCLUSIONS - In this section, interpret your results. First, restate the hypotheses and explain how the data either supported or rejected the initial hypotheses. Discuss your research findings in relationship to what is already known about the research problem (reported in the introduction section). Draw conclusions based upon your research findings. The conclusions can include relevant, subjective observations or comments, but do state that these are speculation.

Acknowledge any limitations which affect the research results. For example, what further experiments need to be performed? Statistical techniques used to manipulate the data may have limitations. Some of the treatment effect might have been caused by a random, uncontrolled, intervening variable. Again, acknowledge these limitations and other factors over which the researcher had no control, and state how these might have influenced the study outcomes.

- g. LITERATURE CITED - This is a list of citations for every article cited in your text. Endnotes are needed for all direct quotations and for all important statements of fact or opinion that are taken from written sources. Figures, dates, descriptions of situations, scientific data, opinion, representations and the like which are presented to advance the subject of the paper must have a stated source. Check with your teacher or other advisors if you need further assistance in the format for endnotes.

- h. APPENDICES - In some cases, you may wish to include large tables of raw data in your report. You should include such items in an appendix at the very end of your research report. Label and paginate your appendices.
- i. ACKNOWLEDGMENT OF MAJOR ASSISTANCE - Include a statement on where and when the research was done and acknowledge those who assisted you with the study.

ADDITIONAL TIPS FOR ABSTRACTS AND RESEARCH PAPERS

1. Use past tense and third person in describing completed research and present tense when stating existing facts and what is in the paper.
2. Incorrect spelling and sentence structure will discourage interest in your project.
3. Assume that the reader has a good general technical vocabulary, but try to avoid use of highly-specialized words or abbreviations.
4. In an abstract, if reference to procedure is essential, try to restrict it to identification of method or type of process employed. In the research paper, discuss the details of procedures and equipment.
5. State results, conclusions, or findings in a clear, concise fashion.
6. Have your teachers read your abstract and paper to make sure they communicate clearly.
7. Helpful references:
 - a. Kathryn, Geese & Rezba, Students and Research (ISBN 0-8403-7766-5)
 - b. Matthews, Bowen & Matthews, Successful Scientific Writing (ISBN 0-521-55948-0)
 - c. Rezba, Sprague, Fiel, Funk, Learning and Assessing Science Process Skills (ISBN 0-8403-8430-0)

Materials Required for Entry: STATEMENT ON OUTSIDE ASSISTANCE

All JSHS applicants prepare and submit a Statement on Outside Assistance form as a part of their registration. This form requires students to report on their contributions to the research investigation. Comments by the supervising teacher and/or supervising mentor are reported, to include 1) comments on the students' individual contributions to the research investigation or engineering/computer science project; and 2) acknowledgment that the student conducted the research in accordance with proper procedures and protocols for the conduct of animal research or human research. Students may only use the JSHS-provided form.

Project Categories

The organization of the presentation sessions is based on the area (category) of research selected by the student. Each session's judging team will include professionals who represent that particular category. Student presenters must state in the application which of the following categories best fits their project:

- **BIOMEDICAL SCIENCES** (*includes Biomedical Medicine, Microbiology, Cellular and Molecular Biology, Genetics, Immunology, Pharmacology, Virology*)
- **CHEMISTRY** (*includes Physical Chemistry, Materials, Alternative Fuels, Organic Chemistry [possibly in Life Sciences], Chemical Engineering, Earth Science, Geochemistry, Alternative Fuels*)

- **ENGINEERING & TECHNOLOGY** *(includes Aerospace, Aerodynamics, Electrical Engineering, Renewable Energy, Vehicle Development, Devices, Mechanical Engineering, Robotics)*
- **ENVIRONMENTAL SCIENCE** *(includes Environmental Engineering, Bioremediation, Ecosystems Management, Land Resource Management, Pollution, Toxicity in Ecosystems)*
- **LIFE SCIENCES** *(includes Developmental Biology, Plant Physiology, Population Genetics, General Biochemistry, Microbiology)*
- **MATHEMATICS & COMPUTER SCIENCE** *(includes Probability and Statistics, Mathematics, Computer Science, Algorithms, Databases, Networking, Computer Engineering)*
- **MEDICINE & HEALTH/BEHAVIORAL SCIENCES** *(includes Behavioral Sciences, Biochemistry, Bioengineering, Disease Diagnosis and Treatment, Epidemiology, Immunology, Neuroscience, Physiology, Pathology)*
- **PHYSICAL SCIENCES** *(includes Astronomy, Theoretical Physics, Solid State Physics, Acoustics, Optics, Thermodynamics, Particle Physics, Quantum Physics, Nuclear Physics. Internet of Things [Network of physical objects embedded with electronics, software, sensors, and network connectivity])*

Team Projects

Students may present a report on work done as part of a class project, or as a science fair project or summer research project. However, students should report on their individual contributions to research. If students are part of a larger group, the presentation should focus on the individual contributions in the larger research project and properly acknowledge the contributions of other students, mentors, and/or teachers. For team research that cannot be divided into individual presentations, a team leader should be selected to present the results of the group work. **Only the team leader (i.e., one student per project) will be invited to attend the Georgia JSHS, if the Georgia JSHS is an in-person event.** In this case, all JSHS directives applying to individual research investigations will apply to group research investigations. In the event the group presenter of the winning regional group is unable to present at the National level, this opportunity will be passed on to the next ranking project. This decision is made because the judges' evaluations and scores pertain to the individual presenter.

For team projects, **all team members** must meet JSHS eligibility (grade 9-12, enrolled in a public, private, or home school in Georgia). Exceptions may be considered on a case-by-case basis at the discretion of GJSHS leadership.

Research Involving Vertebrate Animals or Human Subjects

Research involving vertebrate animals or human subjects must be conducted under the direct supervision of a qualified teacher or mentor with an approved active protocol which complies with local, state, or federal regulations for such research. The JSHS requires students to acknowledge in their written research report, and in the "Statement on Outside Assistance," that proper procedures and protocols were followed. Projects which were conducted without proper supervision will be disqualified from both Regional and National competition.

The JSHS Program recognizes that students may conduct research in a high school setting, and both students and teachers may have questions on how to obtain proper approvals if the research is conducted in a school, home, or field research setting versus in a university laboratory.

General guidelines follow on experimentation involving vertebrate animals (adapted from Bonkalski et al, 1994):

- Only animals that are lawfully acquired shall be used in experimentation and their retention and use shall be in every case in strict compliance with state and local laws and regulations.
- Animals used in experimentation must receive every consideration for their bodily comfort; they must be kindly treated, properly fed, and their surroundings kept in a sanitary condition.
- No intrusive techniques may be used, including surgery, injections, or taking of blood.
- When animals are used by students for their education or the advancement of science, such work shall be under the direct supervision of a committee of individuals knowledgeable of applicable regulations governing the care and animal of animals in the conduct of the project.
- At no time should a student do harm to a vertebrate animal in the conduct of the research.

General guidelines follow on research involving human subjects (adapted from Bonkalski et al., 1994):

- No project may use drugs, food, or beverages in order to measure their effect on a person.
- Projects that involve exercise and its effect on pulse, respiration rate, blood pressure, and so on are approved if a valid normal physical examination is on file and provided the exercise is not carried to the extreme.
- If your research involves administration of questionnaires or surveys, a proper consent from subjects must be obtained.
- No human cultures of any type – mouth, throat, skin, or otherwise – will be allowed.
- Tissue cultures purchased from reputable biological supply houses or research facilities are suitable.
- The only human blood that may be used is that which is either purchased or obtained from a blood bank, hospital, or laboratory. No blood may be drawn by any person or from any person specifically for a science project. This rule does not preclude a student making use of data collected from blood tests not made exclusively for a science project. Blood may not be drawn exclusively for a science project.
- Experimentation involving human subjects requires direct supervision of a committee of individuals knowledgeable of applicable regulations governing the conduct of such research. Non-regulated research institutions (i.e. high schools) should establish a committee of knowledgeable teachers and other mentors to view the research plan prior to the conduct of the research.

Presentation Guidelines

If you are selected as a presenter for the Georgia Junior Science & Humanities Symposium, you will prepare an oral presentation of your scientific research. For this presentation, you may use a computer-projected presentation developed with *PowerPoint* or other presentation software. The presentation should be prepared as a single file with all illustrations and other graphical representations incorporated therein.

Presentations for the 2021 Georgia JSHS will be conducted via web conferencing software (e.g., Zoom). Student presenters will use a Screen Share feature to display and operate their presentation.

The Georgia JSHS is modeled after the National Junior Science and Humanities Symposium (NJSHS). The purpose of the research presentations at the GJSHS is to afford selected students the opportunity and experience of reporting their research and experimentation to an assemblage of their peers, teachers, and other symposium attendees, and to allow judges to select those presentations that merit special recognition.

SESSION TIMING

The research presentation may not exceed 12 minutes, followed by a maximum 6-minute question period. A session moderator will aid the student speaker in maintaining this schedule and in fielding questions from the audience. The procedure for maintaining the time includes a 10-minute signal for the student. At the 12-minute point, the student speaker must stop the presentation even if he or she has not finished. Following the presentation, the session moderator will ask for judges' questions. The speaker should repeat a question before answering so the audience may understand the entire dialogue. The speaker may entertain questions from the audience if time permits and while the exchange appears interesting and relevant. Questions intended to harass the student speakers will not be allowed by the session moderator.

AVAILABLE EQUIPMENT

Presentations for the 2021 Georgia JSHS will be conducted via web conferencing software (e.g., Zoom). Student presenters will use a Screen Share feature to display and operate their presentation. Students will have the opportunity to test the software and learn its basic features prior to the presentation. Students should be prepared to re-show visuals during the questioning period.

VIDEO USAGE

If using videos, students must comply with the following ground rules:

1. The video component cannot make up more than one (1) minute of the presentation and must be directly relevant to the project.
2. The video component should be embedded into the presentation.
3. No audio or background music is permitted other than sounds that are an integral part of the research.
4. Recorded or mechanically produced narration is not permitted. Narration must come from the speaker.
5. Videos (and audio, if any) may be used only for those aspects of the presentation that cannot adequately be presented in a slide. Video material presented must be an integral part of the research and should not be a substitute for presentation of data. Videos must not be used for presentation of common procedures, illustrating equipment, or showing laboratory facilities. Videos should illustrate work that was done and should not be used for stimulation or aesthetic value.

OTHER PRESENTATION AIDS

A research apparatus may be used if it is integral to the presentation and **only if the apparatus is hand-held**. Software such as PowerPoint may be used to prepare or drive presentation.

SUGGESTIONS

Remember, you are the expert. No one in the audience knows as much about your research investigation as you. Therefore, remember to explain your research in enough detail so the audience will understand what you did, how you did it, and what you learned. Whenever possible, avoid jargon or unnecessary terminology. If it is essential to use specialized terms, remember to explain the specialized term briefly. Give your audience enough time to understand what you are trying to convey.

Graphs, tables and other representation help explain your results. Keep them simple and uncluttered. Focus on important information; for example, remember to name the variables on both axes of a graph, and state the significance of the position and shape of the graph line.

Practice will help perfect the presentation and the timing. Deliver your presentation at a comfortable pace. It helps to practice your presentation before a non-specialized audience. Do listen to the advice of your non-specialized audience but also get help from a teacher or other advisors as needed.

Regional and National Judging

At the Georgia Junior Science & Humanities Symposium (GJSJS), the first round of judging occurs when the students' research papers are reviewed by a team of scientists in the field. Selected students are invited to deliver oral presentations of their research at GJSJS February 28 – March 2, 2021. These presentations will represent the finest efforts of high school students in the state or region toward either original laboratory research, field research, or applied research. Following judging of the oral presentations on Monday, March 1, the judging team will deliberate to select approximately ten students for the finalist presentations on Tuesday, March 2. The selection of the student delegates who will advance to the National JSJS will be chosen from the finalists.

During oral presentations, judges are permitted a questioning period during which the judging team may ask questions about the students' paper, research process, or presentation. These questions are intended to aid judges by clarifying the student's depth of understanding, the amount of work and level of effort the student put into the project, and the individual contributions to the research problem.

At the National Junior Science & Humanities Symposium, student research presentations will be organized in concurrent sessions by discipline. Military-sponsored scholarships and other awards will be made to 1st place finalists and runner-up finalists from each of the final sessions.

In the evaluation of the presentations, judges are reminded that a key element of JSJS is the intellectual development of the individual student as an experimenter and researcher. The student presentation should clearly demonstrate in its quality and content that it is an appropriate example for the major objectives of the U.S. Army, Navy, and Air Force Research Offices' National Junior Science and Humanities Symposium.

Judging Criteria

Regional and national judges evaluate the research papers and presentations using the criteria below, which are used as the basis for discussion among judging team members for the selection of students to advance to subsequent rounds of competition:

1. RESEARCH PROBLEM

- Problem is clearly defined.
- Research is based on clear rationale, model, theory, or philosophy.
- Clearly and accurately provides background information.
- Shows thorough understanding of existing knowledge about research problem and its inherent complexities.

2. SCIENTIFIC THOUGHT, CREATIVITY/ORIGINALITY

- Shows understanding and application of appropriate scientific method and processes for the research problem.
- Demonstrates significant individual contributions to and understanding of the research problem.
- Research demonstrates high level of effort.

3. RESEARCH DESIGN, PROCEDURE*

- Procedures are detailed, clearly defined, and appropriate for the problem.
- Identification and control of variables are clearly explained and appropriate.
- Procedures are replicable.

***FOR PROJECTS IN THE ENGINEERING, TECHNOLOGY, & COMPUTER SCIENCE FIELDS:**

- Presents a workable solution that is acceptable to a potential user.
- Recognizes economic feasibility of solution.
- Recognizes relationship between design and end product.
- Tested for performance under conditions of use.
- Results offer improvement over previous alternatives.

4. DISCUSSION/CONCLUSIONS

- Results are clearly stated and thorough.
- Conclusions are logical and relevant to the research problem and results.
- Recognizes limits and significance of results.
- Shows a clear understanding of scientific or technological principles.
- Theoretical or practical implications are explained.

5. SKILL IN COMMUNICATING RESULTS

- Demonstrates clarity in communicating results to non-specialized audience.
- Terms are appropriately and helpfully defined.
- Writing is clear, articulate, and grammatically correct.
- Charts, graphs, and tables are used appropriately and contribute to reader's understanding of the research.

6. SOURCES/ACKNOWLEDGEMENTS

- Student acknowledges sources and major assistance received.

The GJSHS Judging Team and Process

The GJSHS judging team includes individuals who have significant graduate-level education and experience in the general fields of research that are represented by the GJSHS student presenters. Although specialized experience in each student's field of research at the GJSHS is typically represented among the judges, it is not guaranteed given the submitted paper topics and available judges in any given year. Therefore, student presenters are reminded of their responsibility to communicate their results so that they may be understood by both the non-specialized audience and by the judges. Judges are also selected for their interest in encouraging the students and in the future development in the science, engineering, or mathematics fields.

The GJSHS Office, National Science Teachers Association, and the Judging Panel recognize the enormous effort that students undertake in conducting their research. Therefore, our objective is to ensure an equitable competition by selecting qualified judges and by communicating the rules of competition to both students and judges. We realize that in any competition of this nature, differences of opinion about the judges' interpretations may occur. **It is the policy of the sponsors of the Georgia JSBS (e.g. the University of Georgia as well as the Army, Navy, and Air Force) to support the interpretations and final decisions of the judges' panel.**

Regional and National Scholarships

Scholarship Eligibility

- A student must be a citizen or permanent resident of the United States or U.S. territory to be eligible for the government-sponsored scholarship awards.
- The total scholarship awards available through JSBS are capped at a maximum total of \$30,000 per individual student winner.
- Scholarships are awarded to only one student. Student presenters who are part of a team must notify JSBS of which student finalist will receive scholarship funding should the team presentation earn regional or national awards.

Scholarship Conditions

Student scholarship recipients must meet the following:

- Demonstrate full-time enrollment as an undergraduate student at an accredited institution.
- Declare a major in a science, technology, engineering, or mathematics field.
- Maintain a cumulative GPA of 3.0 or above.
- Follow conditions and instructions listed at www.jsbs.org/awards/scholarship-eligibility-and-payments for claiming a JSBS scholarship award.

This document is adapted from materials available at the National JSHS website, www.jshs.org.

Visit the Georgia JSHS website, www.georgiacenter.uga.edu/gjshs, or the National JSHS website, www.jshs.org, for more information.

Helpful documents, such as oral and poster presentation tips, may be found at www.jshs.org/national-symposium/helpful-resources