2016 – 2017 Rules and Guidelines and Application Forms

The New York City Science and Engineering Fair (NYCSEF), sponsored by the New York City Department of Education and the City University of New York, is the largest city-wide research competition for high school students. Each year, approximately 1,000 students submit applications to present their research to a panel of STEM professionals to compete for a variety of cash and prizes. Top researchers from various categories will be selected to represent NYC at the Intel International Science and Engineering Fair (ISEF) in Los Angeles, CA in May.

NYCSEF is an ISEF-affiliated regional fair and as such is governed by the ISEF rules and guidelines outlined for pre-college research. These rules and regulations were developed to provide guidelines for acceptable areas of pre-college research for students by protecting the rights and welfare of the student researcher and human subjects, protecting the health and well-being of vertebrate animal subjects, addressing environmental concerns, and supporting safe laboratory practices.

In some cases, the NYCSEF rules and guidelines may differ from those stated by the Intel ISEF competition, particularly those pertaining to student project displays for NYCSEF events. Complete rules and guidelines for the Intel ISEF can be found at *https://student.societyforscience.org/international-rules-pre-college-science-research*. Students and sponsoring teachers are encouraged to take the time to review these guidelines PRIOR to the start of any research project, the NYCSEF application deadline, and/or event dates. **Any questions or concerns should be directed to NYCSEF staff or the NYCSEF Scientific Review Committee (SRC) by email at <nycsef@cuny.edu>.**

The New York City Science & Engineering Fair's lead sponsor is the New York City Department of Education. The City University of New York is the organizer and sponsor.

The NYCDOE and CUNY gratefully thank all of the educators and professionals who volunteer their time and expertise to work with students to discover and explore through the wonder of research. This dedication and support of pre-college activities helps nurture the scientists, mathematicians and engineers of tomorrow.

Important Dates and Deadlines

December 14, 2016	Wednesday	Application Deadline
March 5, 2017	Sunday	Preliminary Round at the City College of New York
March 28, 2017	Tuesday	Finals Round at the American Museum of Natural History
March 31, 2017	Friday	Awards Ceremony at the BMCC Tribeca Performing Arts Center * Award winners and ISEF finalists will be announced at the ceremony. Awardees must be present to receive their award. **There will be a mandatory ISEF finalists meeting immediately following the Awards Ceremony, no exceptions.
May 14-19, 2017	Sunday – Friday	Intel International Science and Engineering Fair in Los Angeles, CA

Important – Application Submission Information for 2016-2017

Students must complete both the online application and mail-in application forms for consideration to the fair.

For ALL PROJECTS – Students must submit:

1) ONE (1) printout of the completed NYCSEF online application
2) ONE (1) set of the signed NYCSEF supplemental forms (as applicable)
3) TWO (2) copies of the research paper*

All application materials must be POSTMARKED by December 14, 2016 and mailed to:

NYCSEF c/o College Now
City University of New York
16 Court Street, 3rd Floor
Brooklyn, NY 11241

For Finals Round participants only: The research paper* on file may be revised or replaced with a new document showing subsequent data collection and updated analyses and findings no later than March 15th.

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IMPORTANT – Application Changes for 2016-2017

The following are the notable modifications for the 2017 NYCSEF. It is recommended that students and associated adults review the appropriate rules and guidelines as it relates to the specific research project.

- New Category: **Research in Development** – In an effort to encourage the efforts of students new to research, the NYCSEF Scientific Review Committee will invite a limited number of NYCSEF applicants whose projects show great promise but are not competition-ready to join the fair under this new category. **Students may NOT apply to the Research in Development** category. Upon review of the projects, the SRC will contact the teachers who sponsored project(s) that the committee deemed 1) not competition-ready and 2) promising for future competition, and 3) in need of further development and will ask the teacher to nominate students to present their work in this category (Only a few projects from each school will be represented in this category.) As a RD category participant, all attending students will participate in all aspects of the fair; however when meeting with judges their projects will not evaluated for the competition. RD Judges will provide supportive feedback to help the student further develop his/her/their research so that he/she/they may successfully complete in next year's fair. In addition, all attendees will be matched with a NYCSEF mentor to receive in person and online mentorship with their project development and application.

- The Research Plan/Project Summary (Part 1) of the former application has been revised to "Project Summary." In this section, students should now summarize their research and are no longer asked to present a plan of what they expect to achieve when the conduct their experiment. This is now a summary, not a future plan.

- **Revision to NYCSEF rules regarding tissue studies of vertebrate animals:** Studies including tissue collected from vertebrates must adhere to all vertebrate rules and guidelines as described on page 5, Line1 and pages 12-14. Specifically tissues collected from any of the prohibited areas (e.g. studies that induce toxicity, conditioning with aversive stimuli, vertebrate predator-prey studies, mother-infant separation, induced helplessness, studies of pain, etc.) will fail to qualify for NYCSEF.

- F**or projects using human participants:** An Expedited Review is not an accepted form of IRB for entry into the NYCSEF competition. For incomplete or invalid Human Participants Forms - students will be required to submit a letter from each person associated with the project's IRB, stating that they have reviewed the project.

Follow us!

Join the online NYCSEF community to get fair and STEM-related updates, receive invitations to events and learn about research opportunities.

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Information for All Projects

The Rules and Regulations described below are for students competing in the New York City Science and Engineering Fair (NYCSEF) and are derived from the Intel ISEF Rules and Guidelines. Note: Some of the rules and regulations that govern competition for the NYCSEF events differ from those used for the Intel ISEF. Questions about the NYCSEF rules and guidelines should be forwarded to the NYCSEF staff.

Ethics Statement

Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use or presentation of other researcher's work as one's own and fabrication of data. Fraudulent projects will fail to qualify for NYCSEF and Intel ISEF-affiliated fairs.

Eligibility / Limitations

1. Any student in grades 9 – 12 or equivalent, enrolled in a New York City public, private, parochial, or home school* who has not reached the age of 21 on, or before, May 1 of the event year is eligible to participate in NYCSEF. *Home school students MUST be registered with the NYCDOE or be a NYC resident.
2. **Each student may enter only ONE project summarizing data collection or research findings which cover a maximum of 12 continuous months between January 2016 and May 2017.** (*See Continuation of Projects for more information, pg.2*)
3. Team projects may have a maximum of three members. Team members do not have to be from the same school. All team members must be enrolled in a NYC public, private, or parochial high school and must demonstrate each team member's contribution to the project. In cases where team members are not from the same school, the teacher of the Team Leader will be designated as the SPONSORING RESEARCH TEACHER and will receive all communication distributed to sponsoring teachers.
4. Projects that are demonstrations, 'library' research or informational projects, product testing projects, 'explanation' models or kit building examples are not appropriate for competition at NYCSEF.
5. A research project may be a part of a larger study done by professional scientists, but the project presented by the student may only be their portion of the complete study.
6. Students eligible to participate in NYCSEF will not be sponsored or permitted to participate in any other Intel ISEF-affiliated fair. Only those students selected as a NYC Finalist will be invited to attend the Intel ISEF in Los Angeles, CA in May.

General Requirements

1. All students applying to NYCSEF must adhere to all the rules and guidelines as set forth in this document.
2. All projects must adhere to the Ethics Statement above and local, state, county, and US Federal laws, regulations, and permitting conditions.
3. Introduction or disposal of non-native species, pathogens, toxic chemicals or foreign substances into the environment is prohibited. See http://www.anstaskforce.gov/Documents/ISEF.pdf.
4. NYCSEF exhibits must adhere to NYCSEF display and safety requirements. Note: Some rules outlined in this document differ from Intel ISEF rules and guidelines. Students competing in NYCSEF events must also meet NYCSEF rules and regulations.
5. **It is the responsibility of the student, sponsoring research teacher, and the adult sponsor to check with NYCSEF organizers for any additional restrictions or requirements.**

Approval and Documentation

6. **BEFORE experimentation begins**, an Institutional Review Board (IRB) or Scientific Review Committee (SRC) must review and approve most projects involving human subjects, vertebrate animals, and potentially hazardous biological agents. Please refer to the appropriate sections of the Rules and Guidelines for specific information.
7. Every student must complete the **NYCSEF online application**, **Student Checklist (1A), Project Summary parts 1-4,** and **Approval Form (1B)**. These should be reviewed with the Adult Sponsor in order for the **Checklist for Adult Sponsor (1)** to be completed.
8. A **Qualified Scientist** is required for all studies involving BSL-2 potentially hazardous biological agents, DEA-controlled substances, more than minimal risk in human subjects and for all vertebrate animal studies.
9. After initial IRB/SRC approval (if required), any proposed changes in the **Student Checklist (1A)** and **Project Summary** must be re-approved before laboratory experimentation/data collection resumes.

10. Projects which are continuations and which require IRB/SRC approval must be re-approved prior to experimentation/data collection for the current year.
11. Any continuing project must document that the additional research is new and different, regardless of whether the project was or was not submitted in previous competitions. (*See* Continuation *section below.*)
12. If work was conducted in a regulated research institution, industrial setting or any work site other than home, school, or field at any time during the current project year, **Regulated Research Institutional / Industrial Setting Form (1C)** must be completed.
13. Each student or team must complete an online NYCSEF application, in addition to submitting hardcopies of required and supplemental materials. The online application will include: student and project data, a one page abstract (500-word maximum), project summary parts 1-4 (parts 1, 2, & 4 written PRIOR to experimentation as a proposed plan for research, and part 3 including at a minimum preliminary data). Hardcopies of required and supplemental materials that must be sent to NYCSEF will include: ONE printout of the NYCSEF online application Confirmation Form, ONE set of signed NYCSEF required and supplemental forms, and TWO copies of the research paper.
14. All signed forms, certifications, and permits must be available for review by the NYCSEF SRC for the NYCSEF events. Additional documentation may be requested by the NYCSEF SRC for final project approval.
15. Projects containing procedures classified as USDA Pain Category D or E are PROHIBITED for NYCSEF. Experiments that cause death of a vertebrate animal due to the experimental procedure are PROHIBITED.
    a. See Appendix I -USDA Pain Categories and Definitions table on pg. 5.

Continuation of Projects

1. As in the professional world, research projects may be done that build on previous work done in past years. Students will be judged only on the most recent year's research. The project year includes data collection and experimentation conducted over a maximum of 12 continuous months from January 2016 – May 2017.
2. Any project based on the student's prior research could be considered a continuation project including a progression of work within the same field of study. If the current year's project could not have been done without what was learned from the past year's research, then it is considered a continuation project for this competition. These projects must document that the additional research is an expansion from prior work (e.g. testing a new variable or new line of investigation, etc.). Repetition of previous experimentation with the same methodology and research question with an increase in sample size and/or changes in concentrations are examples of unacceptable continuation projects.
3. Display boards must reflect the results and data collected during the current year only. The project title displayed may mention years (for example, "Year Two of an Ongoing Study…"). Supporting data books (not research papers) from previous related research may be exhibited on the table properly labeled as such.
4. Longitudinal studies are permitted as an acceptable continuation under the following conditions:
    a. The study is a multi-year study testing or documenting the same variables in which time is a critical variable. (Examples: Effect of new construction and drainage systems on surrounding estuaries and wildlife in a given period over time.)
    b. Each consecutive year must demonstrate time-based change.
    c. The display board must be based on collective past conclusory data and its comparison to the current year data set. No raw data from previous years may be displayed.

Note: Retain all previous year's paperwork in case an SRC requests documentation of experimentation conducted in prior years.

Team Projects

1. Teams may have up to THREE members. Each team should appoint a team leader to coordinate the work and act as a spokesperson. However each member of the team should also be able to serve as spokesperson, be fully involved with the project, articulate their individual contribution to the entire research project, and be familiar with all aspects of the project. The final work should reflect the coordinated efforts of all team members and will be evaluated using similar rules and judging criteria as individual projects.
2. The Team Leader (Student #1) will be responsible for all communication with NYCSEF and for providing documentation related to the project. **Only ONE application needs to be submitted on behalf of the team.** Individual team members (Students #1, #2, and if #3) will be responsible for providing any/all personal information as requested by NYCSEF staff.
3. Each team member must submit an **Approval Form (1B)**. However team members must jointly submit the **Student Information**, **Team Information**, **Project**

Information, **Checklist for Adult Sponsor (1)**, **abstract**, **Student Checklist (1A)**, **Project Summary Parts 1-4**, **scientific research paper**, and any other required form pertaining to the research project.

4. Full names of all team members must appear on the abstract, project summary parts 1-4, research paper, and forms.
5. Team membership cannot be changed during a given research year (e.g. converting from an individual project to a team project or vice versa) but may be altered in subsequent years. If additional team member(s) leave the team, the remaining team member may present alone but will still compete as a team project.

Non-Inquiry Based Research

Not all areas of study are best served by the scientific (or 'experimental') method-based research. Since engineers, inventors, mathematicians, theoretical physicists, and computer programmers have different objectives than other scientists, they often follow a different process in their work. The process that they use to answer a question or solve a problem is different depending on their area of study and may use their own criteria to arrive at a solution.

1. Engineering Projects

These projects often describe how nature works or creates things that never were. An engineering project should state the engineering goals, the development process and the evaluation of improvements. Replications or models of current structures or mechanisms are not acceptable for entry in the NYCSEF competition.

Engineering projects should include the following:

a. Define a need or improve upon a current design;
b. Provide background and reference to literature that describes what has already been done and what projects already exist that fill a similar need;
c. Considers cost, manufacturing, and user requirements;
d. Tests prototypes or similar model systems.

2. Computer Science Projects

These projects often involve creating and writing new algorithms to solve a problem or improve on an existing algorithm. Simulations, models or 'virtual reality' are other areas on which to conduct research.

3. Mathematics Projects

These projects involve proofs, solving equations, etc. Math is the language of science and is used to explain existing phenomena or prove new concepts and ideas. Math projects can be broadly placed in two categories: pure math (e.g. knot theory geometry) and applied math (e.g. how do you put out fires in the Rocky Mountains using the cellular automata fire model). Math projects submitted for NYCSEF should be based on a relevant topic in math today and describe an intriguing method(s) which compliments the problem. Solutions of math team- or math Olympiad-type questions are not appropriate; however, extensions that potentially add to the knowledge of mathematics will be considered for this competition.

4. Theoretical Projects

These projects can involve a thought experiment, development of new theories and explanations, concept formation, or designing a mathematical model. Theoretical research often proposes answers or solutions to problems where traditional inquiry methods or experimentation is not possible.

Judging at NYCSEF

Judges evaluate and focus on 1) what the student did in the current year; 2) how well a student followed the scientific, engineering, computer programming, or mathematical methodologies; 3) the detail and accuracy of research; 4) whether experimental procedures were used in the best possible way; and 5) how well the student(s) are able to present the research.

1. Judging Criteria

At NYCSEF, students will be evaluated in two main categories: **Scientific Achievement / Accomplishment** (*How well did the student(s) successfully meet the technical and scientific requirements for his/her project?*) and **Merit / Individual Accomplishment** (*How well did the student(s) carry out the project according to his/her ability?*). Judges will be asked to measure the creative ability, scientific thought and/or engineering goals, thoroughness, understanding, and clarity of the students when referring to the research project they are presenting.

Examples of questions judges will be asked to consider:

- How much does this project build upon or add to current knowledge in this area, topic, or field?
- How logical was the experimental design?
- Did the research methods directly address the research problem?
- How thorough was the analysis of available data?
- How much initiative did the student have in carrying out the research project?

- How creative were the student's solutions to the research problem?
- What was the overall comprehension of the topic and supporting information?
- Was the student able to discuss the project clearly?

Judges look for well thought out research. They look at how significant the project is in its field, how thorough the student was, and how much of the experimental thought and design is the student's own work.

Judges get much of the project information from the poster board, abstract and research paper, but it is the **interview** that will be the major determination of work. Judges applaud those students who can speak freely and confidently about their work. They simply want to talk with students about their research to see if they have a good grasp of the research project from start to finish.

2. Helpful hints for judging:

- Greet the judges and introduce yourself.
- Appearance, good manners, appropriate attire, and enthusiasm for what you are doing will impress the judges.
- Judges need to see if you understand the basic principles of math, science, engineering, or technology behind your project and topic area.
- Judges want to know if you have correctly measured and analyzed the data.
- Judges want to know if you can determine possible sources of error in your project and how you might apply your findings in the 'real' world.
- Judges seek to encourage you in your research efforts and future goals and career in the field.
- Finally – and most importantly – relax, smile, and enjoy your time to learn from them and your interaction with them. You should be applauded for all your hard work!

Student Research Papers

A student research paper must be submitted, in addition to any relevant forms and paperwork, in order to complete the NYCSEF application. All application materials must be POSTMARKED no later than December 14, 2016 in order to compete in any of the NYCSEF events.

Student research papers will be used in conjunction with scores received in the Preliminary and Finals round to select the top projects that will represent NYC at the Intel ISEF in May. Below are suggestions for the different sections of a research paper. Keep in mind that some suggestions may not apply depending on the nature of the project.

Abstract

The abstract is a non-critical, informative summary of the significant content and conclusions of the paper. The abstract should not exceed 500 words and should be written in the past tense. The abstract:

- does **not** include any references to tables or figures in the paper or cited literature;
- does **not** include detailed descriptions of systems, equipment, or processes.

Introduction

The introduction provides a brief, historical background and description of the work discussed in the paper. The purpose of the investigation is clearly stated and placed in the context of the field of study and contains properly cited references.

This section:

- describes the nature and significance of the research project;
- provides definitions of new or unusual terms, or those having special meaning related to the project.

Materials and Methods

The materials and methods should be written in paragraph form – step listings will not be accepted – and detailed enough to allow any reader to repeat the experimentation if necessary. However, it is not necessary to include every single step (i.e. how many grams of NaCl was added to water – just the final concentration). This section:

- does not contain any results;
- describes any apparatus that was specifically constructed or modified for use in the study;
- could include a flowchart or diagram for clarification of a complex procedure or apparatus.

Results

The results section summarizes the data in narrative form with tables, graphs, and figures. Tables, graphs, and figures should be integrated into text with verbal elaboration and used to make data coherent, encourage comparison, indicate relationships, and simplify complicated information. This section:

- contains tables, graphs, and figures that are clearly labeled with concise captions;
- does not contain ALL of the raw data collected but should highlight the data relevant to the study;

- does not contain any guesses, conclusions, or interpretations based on the data.

Discussion and Conclusions

The discussion section provides an interpretation of results and how it relates to the original hypothesis and project rationale. This section:

- offers possible explanations of the findings;
- provides recommendations for further study and for improving experimentation.

References / Literature Cited

Students should take care to indicate the sources of the information and include in-text citations using either APA or MLA format for citations – not both. References should:

- contain at least five major references from scientifically and academically accepted sources;
- not include encyclopedias or Internet search engines. These are acceptable starting points for gathering background information but should not be the only sources of reference.

Submission Summary

Students should retain ALL original signed NYCSEF application forms – including the student research paper and follow the submission rules detailed on Page ii.

Only students who follow the proper rules and guidelines and submit ALL necessary materials will be eligible to have their application reviewed by the NYCSEF Scientific Review Committee and be considered for competition in any of the NYCSEF events.

Appendix I: USDA Pain Categories and Definitions for projects involving vertebrate animals:

USDA Pain Categories & Definition	NYCSEF Guidelines
Category A: *Live animals will receive non-painful manipulation. Animals may be euthanized to obtain tissues, cells, etc.*	Permitted only with proper training and certification
Category B: *Live animals will receive momentary pain or stressful stimulus without anesthesia, which results in a short term response. Examples include but are not limited to: injections, field trapping/tagging, blood sampling and standard agricultural husbandry practices.*	Permitted only with proper training and certification
Category C: *Live animals will have significant manipulations, surgery, etc., performed while anesthetized. The animals will be euthanized at the termination of the procedure without regaining consciousness.* Euthanasia may not be performed by the student(s).	Permitted only with proper training and certification in a Registered Research Institution.
Category D: *Live animals will have manipulations performed while anesthetized and are allowed to recover and/or animals will develop discernible clinical signs indicating pain, distress, or significant physiological changes spontaneously or as a result of specific experimental procedures. Examples include, but are not limited to: Survival surgical procedures of any type and some studies which would include tumor development.*	PROHIBITED for entry into NYCSEF
Category E: *Live animals will experience significant / severe pain or distress, without benefit of anesthetics, tranquilizers, or analgesics.*	PROHIBITED for entry into NYCSEF

Roles and Responsibilities of Students & Adults

The Roles and Responsibilities described below are relevant to all NYCSEF events and may differ from those used by Intel ISEF. Specific roles and responsibilities for individuals involved in the Intel ISEF can be found at < https://student.societyforscience.org/international-rules-pre-college-science-research>.

The Student Researcher(s)

The student researcher is responsible for all aspects of the research project including enlisting any needed supervisory adults (Adult Sponsor, Sponsoring Science/Research Teacher, Qualified Scientist, etc.), obtaining necessary approvals (SRC, IRB, etc.), following the Rules and Guidelines for NYCSEF, and doing the experimentation, engineering, data analysis, etc. involved in the project.

The student must be enrolled in a NYC public, private, parochial, or home school* in grades 9–12 or equivalent and must not have reached the age of 21 by May of the event year. Students may compete as a team of up to 3 members, and can be enrolled in different schools, as long as the schools are ALL located within NYC. *Home school students MUST be registered with the NYCDOE or be a NYC resident.

Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use or presentation of other researcher's work as one's own and fabrication of data. Fraudulent projects will fail to qualify for this and future NYCSEF competitions.

The Sponsoring Science/Research Teacher

The Sponsoring Science / Research Teacher is responsible for overseeing the student(s) participation in all aspects of the research project, from the planning phase through the competition phase. The Sponsoring Science/Research Teacher must be an adult or instructor from the applicant's school. **The Sponsoring Science / Research Teacher is required to review all paperwork submitted to NYCSEF by his/her student(s) and sign the Signature Page (see page 28) acknowledging that he/she reviewed the submitted project application.** Information concerning student's application status will also be communicated to the Sponsoring Science/Research Teacher.

For Team Projects, the science / research teacher of the Team Leader (Student #1) will be designated the Sponsoring Science / Research Teacher and will be the primary point of communication between NYCSEF staff and all student members of the research team.

The Adult Sponsor

An Adult Sponsor may be a teacher, parent, university professor, or scientist in whose lab the student is working. This individual must have a solid background in science and should have close contact with the student during the course of the project. The Adult Sponsor is responsible for ensuring the student's research is eligible for entry in this competition. The Adult Sponsor is responsible for working with the student to evaluate any possible risks involved in order to ensure the health and safety of the student conducting the research and the humans or animals involved in the study. The Adult sponsor must review the student's **Student Checklist (1A)** and **Project Summary Parts 1-4** to make sure that: a) experimentation is done within local, state, and federal laws and the NYCSEF rules and guidelines; b) that forms are completed by other adults involved in approving or supervising any part of the experiment; and c) that criteria for the Qualified Scientist adhere to those set forth below.

The Adult Sponsor must be familiar with the regulations that govern potentially dangerous research as they apply to a specific student project. These may include chemical and equipment usage, experimental techniques, research involving human or vertebrate animals, and cell cultures, microorganisms, or animal tissues. The issues must be discussed with the student when completing the **Project Summary Parts 1-4**. Some experiments involve procedures or materials that are regulated by state and federal laws or may not be appropriate for pre-college students. If not thoroughly familiar with the regulations, the Adult Sponsor should help the student enlist the aid of a Qualified Scientist.

The Qualified Scientist

A Qualified Scientist should possess an earned doctoral / professional degree in the area that directly relates to the student's area of research. However, a master's degree with equivalent experience and/or expertise in the student's area of research is acceptable when approved by a Scientific Review Committee (SRC). The Qualified Scientist must be thoroughly familiar with the local, state, and federal regulations that govern the student's area of research.

A student may work with a Qualified Scientist in another city, state or country. In this case, the student must work locally with a Designated Supervisor who has been trained in the techniques the student will use.

Note: The Qualified Scientist, Adult Sponsor, and Sponsoring Science / Research Teacher may be the same person, IF that person is qualified as outlined above.

The Designated Supervisor

The Designated Supervisor is an adult who is directly responsible for overseeing student experimentation. The Designated Supervisor need not have an advanced degree, but should be thoroughly familiar with the student's project, and must be trained in the student's area of research. The Adult Sponsor or the Sponsoring Science / Research Teacher

may act as the Designated Supervisor provided that he/she directly oversees student experimentation.

If a student is experimenting with live vertebrate animals and is in a situation where the animals' behavior or habitat is influenced by humans, the Designated Supervisor must be knowledgeable about the humane care and handling of the animals.

The Institutional Review Board (IRB)

An Institutional Review Board (IRB) is a committee that according to federal regulations (45-CFR-46), must evaluate the potential physical and/or psychological risk of research involving human subjects. All proposed human research must be reviewed and approved by an IRB before experimentation begins. This includes any surveys or questionnaires to be used in a project.

Federal regulations require local community involvement; therefore an IRB should be established at the school level to evaluate human research projects. An IRB at the school or student experimentation level must consist of a minimum of three members. **In order to eliminate conflict of interest, the Sponsoring Science / Research Teacher, Adult Sponsor, parents, Qualified Scientist, and/or the Designated Supervisor who oversee a specific project must not serve on the IRB reviewing that project.** Additional members are recommended to help avoid this conflict of interest and to increase the expertise of the committee. This IRB must include:

a) an educator with experience in subject area, procedures, and/or research being conducted;
b) a school administrator (preferably a principal or assistant principal);
c) and one of the following who is knowledgeable and capable of evaluating the psychological risk involved in a given study: a medical doctor, physician's assistant, registered nurse, a psychiatrist, psychologist, or licensed social worker.

If the IRB needs an expert as one of its members and one is not in the immediate area, then documented contact with an external expert is appropriate and encouraged. A copy of the correspondence (i.e. email, fax, etc.) should be attached to Form 4 and can be used as the signature of that expert.

IRB's exist at federally regulated institutions (i.e. universities, medical centers, NIH, corrections facilities). Prisoner advocates must be included on the IRB when research subjects are at a correctional facility. The institutional IRB must initially review and approve all proposed research conducted at or sponsored by that institution. The Adult Sponsor and the Sponsoring Science / Research Teacher are responsible for ensuring that the project is appropriate for a pre-college student and adhere to all the NYCSEF, ISEF, local, state, and federal rules.

An IRB generally makes the final determination of risk. However, in reviewing projects just prior to a fair, if the NYCSEF SRC judges a local IRB's decision as inappropriate, thereby placing human subjects in jeopardy, the SRC may override the IRB's decision and the project may fail to qualify for competition.

The NYCSEF Scientific Review Committee

A Scientific Review Committee (SRC) is a group of qualified individuals that is responsible for evaluation of student research, certifications, research plans, and exhibits for compliance with the rules and pertinent laws and regulations. Local SRCs must review and approve all projects before experimentation begins.

Any proposed research involving vertebrates and potentially hazardous biological agents must be reviewed and approved BEFORE experimentation. Human studies reviewed and approved by a properly constituted IRB do not have to be reviewed by a SRC until prior to competition. ALL projects must be reviewed and approved by the NYCSEF SRC for compliance with competition rules and deemed eligible for competition in NYCSEF.

An SRC must consist of a minimum of three persons. The SRC must include:

a) a biomedical scientist (Ph. D, M.D., D.V.M., D.D.S., or D.O);
b) an educator with experience in subject area, procedures, and/or research being conducted; and
c) at least one other member with expertise in the area of student research.

In order to eliminate conflict of interest, the Sponsoring Science / Research Teacher, Adult Sponsor, parents, Qualified Scientist, and/or the Designated Supervisor who oversee a specific project must not serve on the SRC reviewing that project. Many projects will require additional expertise to properly evaluate (or instance, extended knowledge of biosafety or of human risk groups.) If animal research is involved, at least one member must be familiar with proper animal care procedures.

Other Review Committees

Certain areas of research conducted in a regulated research institution require review and approval by federally mandated committees that have been established at that institution. These committees are:

a) Institutional Animal Use and Care Committee (IACUC)
b) Institutional Review Board (IRB)
c) Institutional Biosafety Committee (IBC)
d) Embryonic Stem Cell Research Oversight Committee (ESCRO)

It is important that students retain ALL original signed NYCSEF application forms. Only copies of the student application materials should be submitted.

Human Participants Rules

Rules involving human participants

Student researchers must follow federal guidelines (Code of Federal Regulations 45 CFR 46) to protect the human research participant and the student researcher. When students conduct research with humans, the rights and welfare of the participants must be protected. Most human participant studies require preapproval from an Institutional Review Board (IRB)/Human Subjects Participant Program (HSPP) and informed consent/assent from the research participant.

Exempt Studies (Do Not Require IRB Preapproval or Human Participants Paperwork)

Some studies involving humans are exempt from IRB pre-approval or additional human participant forms. Exempt projects for the Intel ISEF and affiliated fairs are:

1. Student-designed Invention, Prototype, Computer Applications or Engineering/Design Project in which the student is the only person testing the invention, prototype or computer application and the testing does not pose a health or safety hazard. It is recommended that a Risk Assessment Form (3) be completed. The use of human participants (other than the student researcher him/herself) for this testing requires IRB review and approval. The Expedited Review process (see page 9) may be used for projects that involve human subjects to test a student designed intervention or prototype.

2. Data/record review studies (e.g., baseball statistics, crime statistics) in which the data are taken from preexisting data sets that are publicly available and/or published and do not involve any interaction with humans or the collection of any data from a human participant for the purpose of the student's research project.

3. Behavioral observations of unrestricted, public settings (e.g., shopping mall, public park) in which all of the following apply:
   a. the researcher has no interaction with the individuals being observed
   b. the researcher does not manipulate the environment in any way and
   c. the researcher does not record any personally identifiable data.

4. Projects in which the student receives pre-existing/retrospective data in a **de-identified/anonymous** format which complies with both of the following conditions:
   a. the professional providing the data certifies in writing that the data have been appropriately de-identified before being given to the student researcher and are in compliance with all privacy and HIPAA laws, and
   b. the affiliated fair SRC ensures that the data were appropriately de-identified by review of the written documentation provided by the supervising adult(s).

Rules

1. The use of human participants in science projects is allowable under the conditions and rules in the following sections. Based upon the Code of Federal Regulations (45 CFR 46), the definition of a **human participant** is a living individual about whom an investigator conducting research obtains (1) data or samples through intervention or interaction with individual(s), or (2) identifiable private information. **These projects require IRB review and preapproval** and may also require documentation of written informed consent/assent/parental permission. Examples of studies that are considered "human participant research" requiring IRB preapproval include:
   a. Participants in physical activities (e.g., physical exertion, ingestion of any substance, any medical procedure)
   b. Psychological, educational and opinion studies (e.g., surveys, questionnaires, tests)
   c. Studies in which the researcher is the subject of the research (Expedited Review may be used, see page 9)
   d. Testing of student designed invention, prototype or computer application by human participants other than student researcher (Expedited Review may be used, see page 9)
   e. Testing of student designed invention or concept by human participants other than student researcher
   f. Data/record review projects that include data that are not de-identified/anonymous (e.g., data set that includes name, birth date, phone number or other identifying variables).
   g. Behavioral observations that
      1) involve any interaction with the observed individual(s) or where the researcher has modified the environment (e.g., post a sign, place an object).
      2) occur in non-public or restricted access settings (e.g., day care setting, doctor's office)
      3) involve the recording of personally identifiable information

2. Student researchers must complete ALL elements of the Human Participants portion of the Research Plan/Project Summary Instructions and evaluate and minimize the physical, psychological and privacy risks to their human participants. See Risk Assessment information on page 11 and the online Risk Assessment Guide (https://student.societyforscience.org/human-participants#riskass) for additional guidance.

3. The research study should be in compliance with all privacy laws (e.g., Family Educational Rights and Privacy Act (FERPA) and Health Insurance Portability and Accountability Act (HIPAA)) laws when they apply to the project (e.g. the project involves medical information).

4. All research projects involving human participants, including any revisions, must be reviewed and approved by an Institutional Review Board (IRB) before the student may begin recruiting and/or interacting with human participants. The IRB must assess the risk and document its determination of risk on Form 4. After initial IRB approval, a student with any proposed changes in the Research Plan/Project Summary must repeat the approval process and regain approval before laboratory experimentation/data collection resumes.

5. Research conducted by a pre-college student at a Regulated Research Institution (e.g., university, college, medical center, government lab, correctional institution) must be reviewed and approved by that institution's IRB. A copy of the IRB approval for the entire project (which must include the research procedures/measures the student is using) and/or an official letter from the IRB attesting to approval is required. A letter from the mentor is not sufficient documentation of IRB review and approval.

6. Research participants must voluntarily give informed consent/assent (in some cases with parental permission) before participating in the study. Adult research participants may give their own consent. Research participants under 18 years of age and/or individuals not able to give consent (e.g. developmentally disabled individuals) give their assent, with the parent/guardian providing permission. The IRB will determine whether the consent/assent/parental permission may be verbal or must be written depending on the level of risk and the type of study, and will determine if a Qualified Scientist is required to oversee the project. Risk Assessment information on page 11 and the online Risk Assessment Guide (https://student.societyforscience.org/human-participants#riskass) for further explanation of informed consent.
    a. Informed consent requires that the researcher provides complete information to the participant (and where applicable, parents or guardians) about the risks and benefits associated with participation in the research study, which then allows the participants and parents or guardians to make an informed decision about whether or not to participate.
    b. Participants must be informed that their participation is voluntary (i.e., they may participate or decline to participate, with no adverse consequences of nonparticipation or aborted participation) and that they are free to stop participating at any time.
    c. Informed consent may not involve coercion and is an on-going process, not a single event that ends with a signature.
    d. When written parental permission is required and the study includes a survey, the survey must be attached to the consent form.
    e. The student researcher may request that the IRB waive the requirement for written informed consent/parental permission in his/her research plan if the project meets specific requirements. See section on IRB waivers for more information about situations in which written parental permission and/or written informed consent can be waived by the IRB.

7. A student may observe and collect data for analysis of medical procedures and medication administration only under the direct supervision of a medical professional. This medical professional must be named in the research protocol approved by the IRB. Students are prohibited from administering medication and/or performing invasive medical procedures on human participants. The IRB must also confirm that the student is not violating the medical practice act of the state or country in which he/she is conducting the research.

8. Student researchers may NOT publish or display information in a report that identifies the human participants directly or through identifiers linked to the participants (including photographs) without the written consent of the participant(s) (Public Health Service Act, 42, USC 241 (d)).

9. All published instruments that are not in the public domain must be administered, scored and interpreted by a Qualified Scientist as required by the instrument publisher. Any and all use and distribution of the test must be in accordance with the publisher's requirements, including procurement of legal copies of the instrument.

10. Studies that involve the collection of data via use of the internet (e.g., email, web-based surveys) are allowed, but researchers should be aware that they can pose challenges in a) collecting anonymous data, b) obtaining informed consent and c) ensuring that participants are of the appropriate age to give informed consent. See the Online Studies Section of the Risk Assessment Guide.

11. After experimentation and before Intel ISEF competition, the Intel ISEF SRC reviews and approves previously-approved projects to ensure that students followed the approved Research Plan/Project Summary and all of the Intel ISEF rules.

12. The following forms are required for studies involving human participants:
    a. Checklist for Adult Sponsor (1), Student Checklist (1A), Research Plan/Project Summary, and Approval Form (1B)
    b. Human Participants Form (4) with applicable consents and survey(s)
    c. Regulated Research Institution Form (1C), when applicable
    d. Qualified Scientist Form (2), when applicable
    e. Risk Assessment (3) when applicable

IRB Waiver of Written Informed Consent/Parental Permission

The IRB may waive the requirement for documentation of written informed consent/assent/parental permission if the research involves only minimal risk and anonymous data collection and if it is one of the following:

- Research involving normal educational practices
- Research on individual or group behavior or characteristics of individuals where the researcher does not manipulate the participants' behavior and the study does not involve more than minimal risk.
- Surveys, questionnaires, or activities that are determined by the IRB to involve perception, cognition, or game theory, etc. and that do NOT involve gathering personal information, invasion of privacy or potential for emotional distress.
- Studies involving physical activity where the IRB determines that no more than minimal risk exists and where the probability and magnitude of harm or discomfort anticipated in the research are not greater than those ordinarily encountered in DAILY LIFE or during performance of routine physical activities.

If there is any uncertainty regarding the appropriateness of waiving written informed consent/assent/parental permission, it is strongly recommended that documentation of written informed consent/assent/parental permission be obtained.

Expedited Review

An expedited review by only one member of the IRB may be conducted for projects that meet one of the criteria listed below. The IRB member reviewing the project will determine whether appropriate safety precautions will be employed and whether the project meets criteria for expedited review. If a project submitted for expedited review does not meet the criteria specified below, the project must undergo full IRB review. The IRB member reviewing the project must have the expertise necessary to make such a decision and/or receive advisement from an appropriate expert.

- Student-designed Invention, Prototype, Computer Application, or Engineering/Design Project: The data received in these types of projects must be in direct reference to the design. Personal data are not collected and the testing does not pose a health or safety hazard.

Or

- Projects in which the student is the subject of his/her own research study and the project does not involve more than minimal risk.

Human Participant Involvement in Student-designed Invention, Prototype, Computer Application & Engineering/Design Projects

Student-designed invention, prototype, computer application and engineering/design projects that involve testing of the invention by any human participant require attention to the potential risks to the individual(s) testing or trying out the invention/prototype. To be considered for Exempt Status or Expedited Review, the data collected/feedback received must be a direct reference to the invention/prototype (i.e., personal data cannot be collected) and the testing may not pose a health or safety risk.

- Exempt Status can be used when the student researcher is the only person testing the invention/prototype. It is recommended that a Risk Assessment Form (3) be completed.
- Expedited Review can be used if the project includes participants other than the student researcher.
- Full IRB Review is necessary if the activities involved in testing of the invention or prototype are more than minimal risk and/or involve collection of personal information from participants.

Human Participant Risk Assessment

Use this information to help determine the level of risk involved in a study involving human participants.

Projects involving no more than minimal risk and those with more than minimal risk are allowed under the following guidelines.

No more than minimal risk exists when the probability and magnitude of harm or discomfort anticipated in the research are not greater (in and of themselves) than those ordinarily encountered in everyday life or during performance of routine physical or psychological examinations or tests.

More than minimal risk exists when the possibility of physical or psychological harm or harm related to breach of confidentiality or invasion of privacy is greater than what is typically encountered in everyday life. Most of these studies require documented informed consent or minor assent with the permission of parent or guardian (as applicable).

1. **Examples of Greater than Minimal Physical Risk**
   a. Exercise other than ordinarily encountered in everyday life
   b. Ingestion, tasting, smelling, or application of a substance. However, ingestion or tasting projects that involve commonly available food or drink will be evaluated by the IRB which determines risk level based upon the nature of the study and local norms.
   c. Exposure to any potentially hazardous material.

2. **Examples of Greater than Minimal Psychological Risk**
   A research activity (e.g. survey, questionnaire, viewing of stimuli) or experimental condition that could potentially result in emotional stress. Some examples include: answering questions related to personal experiences such as sexual or physical abuse, divorce, depression, anxiety; answering questions that could result in feelings of depression, anxiety, or low self esteem; or viewing violent or distressing video images.

3. **Privacy Concerns**
   a. The student researcher and IRB must consider whether an activity could potentially result in negative consequences for the participant due to invasion of privacy or breach of confidentiality. Protecting confidentiality requires measures to ensure that identifiable research data are not disclosed to the public or unauthorized individuals.
   b. Risk level can be reduced by protecting confidentiality or collecting data that is strictly anonymous. This requires the collection of research in such a way that it is impossible to connect research data with the individual who provided the data.

4. **Risk Groups**
   If the research study includes participants from any of the following groups, the IRB and student research must consider whether the nature of the study requires special protections or accommodations:
   a. Any member of a group that is naturally at-risk (e.g. pregnant women, developmentally disabled persons, economically or educationally disadvantaged persons, individuals with diseases such as cancer, asthma, diabetes, AIDS, dyslexia, cardiac disorders, psychiatric disorders, learning disorders, etc.)
   b. Special groups that are protected by federal regulations or guidelines (e.g. children/minors, prisoners, pregnant women, students receiving services under the Individuals with Disabilities Education Act (IDEA).

   See the online Risk Assessment Guide (https://student.societyforscience.org/human-participants#riskass) and Online Survey Consent Procedures (https://member.societyforscience.org/document.doc?id=40) for more detailed information on risk assessment.

Vertebrate Animals Rules

Rules involving vertebrate animals

The following rules were developed to help pre-college student researchers adhere to the federal regulations governing professional scientists and to protect the welfare of both animal subjects and the student researcher. Health and well-being is of high priority when students conduct research with animal subjects.

The Society strongly endorses the use of non-animal research methods and encourages students to use alternatives to animal research. If the use of vertebrate animals is necessary, students must consider additional alternatives to reduce and refine the use of animals.

All projects involving vertebrate animals must adhere to the rules below AND to either Section A or Section B rules, depending on the nature of the study and the research site.

A project is considered a tissue study and not a vertebrate animal study if tissue is obtained from an animal that was euthanized for a purpose other than the student's project. (Documentation is required of the IACUC approval for the original animal study from which tissues are obtained.) In tissue studies, a student may observe the vertebrate study, but may not manipulate or have any direct involvement in the vertebrate animal experimental procedures.

Rules for ALL Vertebrate Animal Studies

1. The use of vertebrate animals in science projects is allowable under the conditions and rules in the following sections. Vertebrate animals, as covered by these rules, are defined as:
   a. Live, nonhuman vertebrate mammalian embryos or fetuses
   b. Tadpoles
   c. Bird and reptile eggs within three days (72 hours) prior to hatching
   d. All other nonhuman vertebrates (including fish) at hatching or birth.

   Exception: Because of their delayed cognitive neural development, zebrafish embryos are not considered vertebrate animals until 7 days (168 hours) post- fertilization.

2. Alternatives to the use of vertebrate animals for research must be explored and discussed in the research plan. The guiding principles for the use of animals in research include the following "Four Rs":
   a. Replace vertebrate animals with invertebrates, lower life forms, tissue/cell cultures and/or computer simulations where possible.
   b. Reduce the number of animals without compromising statistical validity.
   c. Refine the experimental protocol to minimize pain or distress to the animals.
   d. Respect animals and their contribution to research.

3. All vertebrate animal studies must be reviewed and approved before experimentation begins. An Institutional Animal Care and Use Committee, known as an IACUC, is the institutional animal oversight review and approval body for all animal studies at a Regulated Research Institution. The local OR affiliated fair SRC serves in this capacity for vertebrate animals studies performed in a school, home or field. Any SRC serving in this capacity must include a veterinarian or an animal care provider with training and/or experience in the species being studied.

4. All vertebrate animal studies must have a research plan that includes:
   a. Justification why animals must be used, including the reasons for the choice of species, the source of animals and the number of animals to be used; description, explanation, or identification of alternatives to animal use that were considered, and the reasons these alternatives were unacceptable; explanation of the potential impact or contribution this research may have on the broad fields of biology or medicine.
   b. Description of how the animals will be used. Include methods and procedures, such as experimental design and data analysis; description of the procedures that will minimize the potential for discomfort, distress, pain and injury to the animals during the course of experimentation; identification of the species, strain, sex, age, weight, source and number of animals proposed for use.

5. Studies involving behavioral observations of animals are exempt from prior SRC review if ALL of the following apply:
   a. There is no interaction with the animals being observed,
   b. There is no manipulation of the animal environment in any way, and
   c. The study meets all federal and state agriculture, fish, game and wildlife laws and regulations.

6. Students performing vertebrate animal research must satisfy US federal law as well as local, state, and country laws and regulations of the jurisdiction in which research is performed.

7. Research projects which cause more than momentary or slight pain or distress are prohibited. Any illness or unexpected weight loss must be investigated and a veterinarian consulted to receive required medical care. This investigation must be documented by the Qualified Scientist or Designated Supervisor, who is qualified to determine the illness, or by a veterinarian. If the illness or distress is caused by the study, the experiment must be terminated immediately.

8. No vertebrate animal deaths due to the experimental procedures are permitted in any group or subgroup.
   a. Studies that are designed or anticipated to cause vertebrate animal death are prohibited.
   b. Any death that occurs must be investigated by a veterinarian, the Qualified Scientist or the Designated Supervisor who is qualified to determine if the cause of death was incidental or due to the experimental procedures. The project must be suspended until the cause is determined and then the results must be documented in writing.
   c. If death was the result of the experimental procedure, the study must be terminated, and the study will not qualify for competition.

9. All animals must be monitored for signs of distress. Because significant weight loss is one sign of stress, the maximum permissible weight loss or growth retardation (compared to controls) of any experimental or control animal is 15%.

10. Students are prohibited from designing or participating in an experiment associated with the following types of studies on vertebrate animals:
    a. Induced toxicity studies with known toxic substances that could cause pain, distress or death, including but not limited to alcohol, acid rain, pesticides, or heavy metals.
    b. Behavioral experiments using conditioning with aversive stimuli, mother/infant separation or induced helplessness.
    c. Studies of pain.
    d. Predator/vertebrate prey experiments.

11. Justification is required for an experimental design that involves food or fluid restriction and must be appropriate to the species. If the restriction exceeds 18 hours, the project must be reviewed and approved by an IACUC and conducted at a Regulated Research Institution.

12. Animals may not be captured from or released into the wild without approval of authorized wildlife or other regulatory officials. All appropriate methods and precautions must be used to decrease stress. Fish may be obtained from the wild only if the researcher releases the fish unharmed, has the proper license, and adheres to state, local and national fishing laws and regulations. The use of electrofishing is permissible only if conducted by a trained supervisor; students are prohibited from performing electrofishing.

13. A Qualified Scientist or Designated Supervisor must directly supervise all research involving vertebrate animals, except for observational studies.

14. After initial SRC approval, a student with any proposed changes in the Research Plan/Project Summary of the project must repeat the approval process before laboratory experimentation/data collection resumes.

A. Additional Rules for Projects Conducted at School/ Home/Field

Vertebrate animal studies may be conducted at a home, school, farm, ranch, in the field, etc. This includes:

a. Studies of animals in their natural environment.
b. Studies of animals in zoological parks.
c. Studies of livestock that use standard agricultural practices.
d. Studies of fish that use standard aquaculture practices

These projects must be reviewed and approved by an SRC in which one member is either a veterinarian and/or an animal care provider/expert with training and/or experience in the species being studied.

1. These projects must adhere to BOTH of the following guidelines:
    a. The research involves only agricultural, behavioral, observational or supplemental nutritional studies on animals.

    AND

    b. The research involves only non-invasive and non-intrusive methods that do not negatively affect an animal's health or well-being.

    All vertebrate animal studies that do not meet the above guidelines must be conducted in a Regulated Research Institution (see Section B).

2. Animals must be treated kindly and cared for properly. Animals must be housed in a clean, ventilated, comfortable environment appropriate for the species. They must be given a continuous, clean (uncontaminated) water and food supply. Cages, pens and fish tanks must be cleaned frequently. Proper care must be provided at all times, including weekends, holidays, and vacation periods. Animals must be observed daily to assess their health and well-being. A Designated Supervisor is required to oversee the daily husbandry of the animals. Any of the following U.S. documents provide further guidance for animal husbandry:
    - Federal Animal Welfare Regulation
    - Guide for the Care and Use of Laboratory Animals
    - Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (Ag-Guide)
    - Quality Assurance Manuals (for the appropriate species)

3. The local or affiliated fair Scientific Review Committee must determine if a veterinarian's certification of the research and animal husbandry plan is required. This certification, as well as SRC approval, is required before experimentation and is documented on Vertebrate Animal Form 5A. A veterinarian must certify experiments that involve supplemental nutrition, administration of prescription drugs and/or activities that would not be ordinarily encountered in the animal's daily life.

4. If an illness or emergency occurs, the affected animal(s) must receive proper medical or nursing care that is directed by a veterinarian. A student researcher must stop experimentation if there is unexpected weight loss or death in the experimental subjects. The experiment can only be resumed if the cause of illness or death is not related to the experimental procedures and if appropriate steps are taken to eliminate the causal factors. If death is the result of the experimental procedure, the study must be terminated, and the study will not qualify for competition.

5. The final disposition of the animals must be described on Vertebrate Animal Form 5A.
6. Euthanasia for tissue removal and/or pathological analysis is not permitted for a project conducted in a school/home/field site. Livestock or fish raised for food using standard agricultural/aquacultural production practices may be euthanized by a qualified adult for carcass evaluation.

7. The following forms are required:
    a. Checklist for Adult Sponsor (1), Student Checklist (1A), Research Plan/Project Summary, and Approval Form (1B)
    b. Vertebrate Animal Form (5A)
    c. Qualified Scientist Form (2), when applicable

B. Additional Rules for Projects Conducted in a Regulated Research Institution

All studies not meeting the criteria in Section A that are otherwise permissible under Intel ISEF rules must be conducted in a Regulated Research Institution (RRI). A Regulated Research Institution within the U.S. is defined as a professional research/teaching institution that is regularly inspected by the USDA and is licensed to use animals covered by the Animal Welfare Act and may also be subject to U.S. Public Health Service Policy. Also included are all federal laboratories such as National Institutes of Health, Veteran's Affairs Medical Centers and the Centers for Disease Control. In addition, pharmaceutical and biotechnology companies and research institutions that utilize research animals that are not covered by the Animal Welfare Act but have an operational Institutional Animal Care and Use Committee and

are in compliance with U.S. federal laws are included in this definition. For projects conducted outside of the United States, a Regulated Research Institution would be a comparable research institution that adheres to country laws governing the care and use of vertebrate animals.

Some protocols permitted in a Regulated Research Institution are not permitted for participation in the Intel ISEF; adherence to RRI rules is necessary but may not be sufficient.

1. The Institutional Animal Care and Use Committee (IACUC) or the comparable animal oversight committee must approve all student research projects before experimentation begins. Such research projects must be conducted under the responsibility of a principal investigator. The local and affiliated fair SRCs must also review the project to certify that the research project complies with Intel ISEF Rules. This local and regional SRC review should occur before experimentation begins, if possible.

2. Student researchers are prohibited from performing euthanasia. Euthanasia at the end of experimentation for tissue removal and/or pathological analysis is permitted. All methods of euthanasia must adhere to current American Veterinarian Medical Association (AVMA) Guidelines.

3. Research projects that cause more than momentary or slight pain or distress to vertebrate animals that is not mitigated by approved anesthetics, analgesics and/or tranquilizers are prohibited.

4. Research in nutritional deficiency or research involving substances or drugs of unknown effect is permitted to the point that any clinical sign of distress is noted. In the case that distress is observed, the project must be suspended and measures must be taken to correct the deficiency or drug effect. A project can only be resumed if appropriate steps are taken to correct the causal factors.

5. The following forms are required:
   a. Checklist for Adult Sponsor (1), Student Checklist (1A), Research Plan/Project Summary, and Approval Form (1B)
   b. Regulated Research Institution Form (1C)
   c. Qualified Scientist Form (2)
   d. Vertebrate Animal Form (5B)
   e. PHBA Risk Assessment Form (6A) – for all studies involving tissues and body fluids.
   f. Human and Vertebrate Animal Tissue Form (6B) – for all studies involving tissues and body fluids.

Sources of Information are available as a separate section at the end of the document.

Potentially Hazardous Biological Agents (PHBA) Rules

Potentially Hazardous Biological Agents Rules for use of microorganisms (including bacteria, viruses, viroids, prions, rickettsia, fungi, and parasites), recombinant DNA (rDNA) technologies or human or animal fresh/frozen tissues, blood, or body fluids.

Research using microorganisms (including bacteria, viruses, viroids, prions, rickettsia, fungi, and parasites), recombinant DNA (rDNA) technologies or human or animal fresh/frozen tissues, blood, or body fluids may involve potentially hazardous biological agents. Students are permitted to do some research projects with potentially hazardous biological agents meeting the conditions and rules described below which were designed to protect students and to ensure adherence to federal and international biosafety regulations and guidelines.

When dealing with potentially hazardous biological agents, it is the responsibility of the student and all of the adults involved in a research project to conduct and document a risk assessment on Form (6A) to define the potential level of harm, injury or disease to plants, animals and humans that may occur when working with biological agents. The risk assessment determines a biosafety level which in turn determines if the project can proceed, and if so, the laboratory facilities, equipment, training, and supervision required.

All projects involving microorganisms, recombinant DNA technologies and human or animal fresh/frozen tissues, blood or body fluids must adhere to the rules below AND, depending on the study, to the additional rules in Section A, B or C.

Rules for ALL Studies with Potentially Hazardous Biological Agents (PHBA)

1. The following types of studies involve BSL-1 organisms and are exempt from prior SRC review and require no additional forms:
   a. Studies involving baker's yeast and brewer's yeast, except in rDNA studies.
   b. Studies involving *Lactobacillus*, *Bacillus thuringiensis*, nitrogen-fixing, oil-eating, and algae-eating bacteria introduced into their natural environment. (Not exempt if cultured in a petri dish environment.)
   c. Studies involving water or soil not concentrated in media conducive to their microbial growth (please review all rules below to ensure that there are not more specific rules that may apply).
   d. Studies of mold growth on food items if the experiment is terminated at the first evidence of mold.
   e. Studies of slime molds and edible mushrooms.
   f. Studies involving *E. coli k–12* which are done at school and are not recombinant DNA studies.

2. The following types of studies are exempt from prior SRC review, but require a Risk Assessment Form 3:
   a. Studies involving protists, archaea and known non-pathogenic microorganisms.
   b. Research using manure for composting, fuel production, or other non-culturing experiments.
   c. Commercially-available color change coliform water test kits. These kits must remain sealed and must be properly disposed.
   d. Studies involving decomposition of vertebrate organisms (such as in forensic projects).
   e. Studies with microbial fuel cells.

3. Prior review and approval is required for the use of potentially hazardous microorganisms (including bacteria, viruses, viroids, prions, rickettsia, fungi, and parasites), recombinant DNA (rDNA) technologies or human or animal fresh/frozen tissues, blood, or body fluids:
   a. An affiliated fair SRC, an IBC or an IACUC must approve all research before experimentation begins. The initial risk assessment determined by the student researcher and adults supervising the project must be confirmed by the SRC, IBC or IACUC.
   b. Experimentation involving the culturing of potentially hazardous biological agents, even BSL-1 organisms, is prohibited in a home environment. However, specimens may be collected at home as long as they are immediately transported to a laboratory with the BSL containment determined by the affiliated fair SRC.
   c. Research determined to be at Biosafety Level 1 (BSL-1) must be conducted in a BSL-1 or higher laboratory. The research must be supervised by a trained Designated Supervisor or a Qualified Scientist. The student must be properly trained in standard microbiological practices.
   d. Research determined to be a Biosafety Level 2 (BSL-2) must be conducted in a laboratory rated BSL-2 or above (commonly limited to a Regulated Research Institution). The research must be reviewed and approved by the Institutional Biosafety Committee (IBC) if the Regulated Research Institution requires the review. The research must be supervised by a Qualified Scientist. For a high school BSL-2 laboratory, the SRC must review and approve.
   e. Students are prohibited from designing or participating in an experiment associated with the following types of PHBA studies:
      - BSL-3 or BSL-4 Research
      - Culturing CRE (Carbapenem Resistant Enterobacteriacae)
   f. Insertion of antibiotic resistance markers for the clonal selection of bioengineered organisms is permitted. Students may not genetically engineer organisms with multiple drug resistance traits for the intended purpose of investigation of the pathology or treatment of antibiotic-resistant infections. Insertion of antibiotic-resistance traits or selection of organisms expressing traits that may affect the ability to provide effective treatment of infections acquired by humans, animals, or plants is strictly prohibited.
   g. Laboratory studies culturing known MRSA (Methicillin-resistant *Staphylococcus aureus*), VRE (Vancomycin-resistant enterococci) and KPC *(Klebsiella pneumonia)* must have a written justification for usage and be conducted at a Regulated Research Institution with a minimum BSL-2 laboratory with documented IBC Committee review and approval.
   h. Extreme caution must be exercised when selecting and sub-culturing antibiotic-resistant organisms. Studies using such organisms require at least BSL-2 containment.
   i. Naturally-occurring plant pathogens may be studied (not cultured) at home, but may not be introduced into a home/garden environment.

j. The culturing of human or animal waste, including sewage sludge, is considered a BSL-2 study.
k. All potentially hazardous biological agents must be properly disposed at the end of experimentation in accordance with their biosafety level. For BSL 1 or BSL 2 organisms: Autoclave at 121 degrees Celsius for 20 minutes, use of a 10% bleach solution (1:10 dilution of domestic bleach), incineration, alkaline hydrolysis, biosafety pick-up and other manufacturer recommendations are acceptable.
l. Any proposed changes in the Research Plan/Project Summary by the student after initial local or affiliated fair SRC approval must undergo subsequent SRC or IBC review and approval before such changes are made and before experimentation resumes.

4. The following forms are required:
   a. Checklist for Adult Sponsor (1), Student Checklist (1A), Research Plan/Project Summary, and Approval Form (1B)
   b. Regulated Research Institution Form (1C) - when applicable
   c. Qualified Scientist (2), when applicable
   d. Risk Assessment (3), when applicable
   e. PHBA Risk Assessment Form (6A), when applicable
   f. Human and Vertebrate Animal Tissue Form (6B) – for all studies involving tissues and body fluids.

A. Additional Rules for Projects Involving Unknown Microorganisms

Studies involving unknown microorganisms present a challenge because the presence, concentration and pathogenicity of possible agents are unknown. In science fair projects, these studies typically involve the collection and culturing of microorganisms from the environment (e.g. soil, household surfaces, skin.)

1. Research with unknown microorganisms can be treated as a BSL-1 study under the following conditions:
   a. Organism is cultured in a plastic petri dish (or other standard non-breakable container) and sealed. Other acceptable containment includes two heavy-duty (2-ply) sealed bags.
   b. Experiment involves only procedures in which the petri dish remains sealed throughout the experiment (e.g., counting presence of organisms or colonies).
   c. The sealed petri dish is disposed of via autoclaving or disinfection under the supervision of the Designated Supervisor.

2. If a culture container with unknown microorganisms is opened for any purpose, (except for disinfection for disposal), it must be treated as a BSL-2 study and involve BSL-2 laboratory procedures.

B. Additional Rules for Projects Involving Recombinant DNA (rDNA) Technologies

Studies involving rDNA technologies in which microorganisms have been genetically modified require close review to assess the risk level assignment. Some rDNA studies can be safely conducted in a BSL-1 high school laboratory with prior review by a knowledgeable SRC:

1. All rDNA technology studies involving BSL-1 organisms and BSL-1 host vector systems must be conducted in a BSL-1 laboratory under the supervision of a Qualified Scientist or Designated Supervisor and must be approved by the SRC prior to experimentation. Examples include cloning of DNA in *E. coli K–12*, *S. cerevesiae*, and *B. subtilis* host-vector systems.

2. Commercially available rDNA kits using BSL-1 organisms may be conducted in a BSL-1 laboratory under the supervision of a Qualified Scientist or trained Designated Supervisor and must be approved by the SRC prior to experimentation.

3. An rDNA technology study using BSL-1 agents that may convert to BSL-2 agents during the course of experimentation must be conducted entirely in a BSL-2 facility.

4. All rDNA technology studies involving BSL-2 organisms and/or BSL-2 host vector systems must be conducted in a Regulated Research Institution and approved by the IBC prior to experimentation.

5. Propagation of recombinants containing DNA coding for human, plant or animal toxins (including viruses) is prohibited.

C. Additional Rules for Projects with Tissues and Body Fluids, including Blood and Blood Products

Studies involving fresh/frozen tissue, blood or body fluids obtained from humans and/or vertebrates may contain microorganisms and have the potential of causing disease. Therefore, a proper risk assessment is required.

1. The following types of tissue do not need to be treated as potentially hazardous biological agents:
   a. Plant tissue (except those known to be toxic or hazardous)
   b. Plant and non-primate established cell lines and tissue culture collections (e.g., obtained from the American Type Culture Collection). The source and/or catalog number of the cultures must be identified in the Research Plan/ Project Summary.
   c. Fresh or frozen meat, meat by-products, pasteurized milk or eggs obtained from food stores, restaurants, or packing houses
   d. Hair, hooves, nails and feathers
   e. Teeth that have been sterilized to kill any blood-borne pathogen that may be present.
   f. Fossilized tissue or archeological specimens.
   g. Prepared fixed tissue

2. Research involving human and/or non-human primate established cell lines and tissue culture collections (e.g., obtained from the American Type Culture Collection) must be considered a BSL-1 or BSL-2 level organism as indicated by source information and treated accordingly. The source and/ or catalog number of the cultures must be identified in the Research Plan/Project Summary.

3. If tissues are obtained from an animal that was euthanized for a purpose other than the student's project, it may be considered a tissue study. Use of tissues obtained from research conducted at a Regulated Research Institution, requires documentation of the IACUC approval for the original animal study. Use of tissues obtained from agricultural/ aquacultural studies require prior SRC approval.

4. If the animal was euthanized solely for the student's project, the study must be considered a vertebrate animal project and is subject to the vertebrate animal rules. (See vertebrate animal rules.)

5. The collection and examination of fresh/frozen tissue and/or body fluids, (not including blood or blood products; see rule 8) from a non-infectious source with little likelihood of microorganisms present must be considered Biosafety level 1 studies and must be conducted in a BSL-1 laboratory or higher and must be supervised by a Qualified Scientist or trained Designated Supervisor.

6. The collection and examination of fresh/frozen tissues or body fluids or meat, meat by-products, pasteurized milk or eggs NOT obtained from food stores, restaurants, or packing houses may contain microorganisms. Because of the increased risk from unknown potentially hazardous agents, these studies must be considered biosafety level 2 studies conducted in a BSL-2 laboratory under the supervision of a Qualified Scientist.

7. Human breast milk of unknown origin, unless certified free of HIV and Hepatitis C, and domestic unpasteurized animal milk are considered BSL-2.

8. All studies involving human or wild animal blood or blood products should be considered at a minimum a Biosafety level 2 study and must be conducted in a BSL-2 laboratory under the supervision of a Qualified Scientist. Known BSL-3 or BSL-4 blood is prohibited. Studies involving domestic animal blood may be considered a BSL-1 level study. All blood must be handled in accordance with standards and guidelines set forth in the OSHA, 29CFR, Subpart Z. Any tissue or instruments with the potential of containing blood-borne pathogens (e.g. blood, blood products, tissues that release blood when compressed, blood contaminated instruments) must be properly disposed after experimentation.

9. Studies of human body fluids, where the sample can be identified with a specific person, must have IRB review and approval, and informed consent.

10. Any study involving the collection and examination of body fluids may contain biological agents belonging to BSL-3 or BSL-4 is prohibited.

11. A project involving a student researcher using their own body fluids (if not cultured)
    a. can be considered a BSL-1 study
    b. may be conducted in a home setting
    c. must have IRB review if the body fluid is serving as a measure of an effect of an experimental procedure on the student researcher (e.g. Student manipulates diet and takes a blood or urine sample). An example of a project not needing IRB review would be collecting urine to serve as a deer repellent.
    d. must receive prior SRC review and approval prior to experimentation.

12. Studies involving embryonic human stem cells must be conducted in a Registered Research Institution and reviewed and approved by the ESCRO (Embryonic Stem Cell Research Oversight) Committee.

Sources of Information are available as a separate section at the end of the document.

Potentially Hazardous Biological Agents Risk Assessment

Use this information to complete PHBA Risk Assessment Form (6A)

Risk assessment defines the potential level of harm, injury or disease to plants, animals and humans that may occur when working with biological agents. The end result of a risk assessment is the assignment of a biosafety level which then determines the laboratory facilities, equipment, training, and supervision required. Risk assessment involves:

1. Assignment of the biological agent to a risk group
2. Studies involving a known microorganism must begin with an initial assignment of the microorganism to a biosafety level risk group based on information available through a literature search.
3. The study of unknown microorganisms and the use of fresh tissues relies on the expertise of the supervising adult(s).
4. Determination of the level of biological containment available to the student researcher to conduct the experimentation. (See "Levels of Biological Containment" for details.)
5. Assessment of the experience and expertise of the adult(s) supervising the student.
6. Assignment of a biosafety level for the study based on risk group of biological agent, level of biological containment available and the expertise of the Qualified Scientist or Designated Supervisor who will be supervising the project
7. Documentation of review and approval of study prior to experimentation:
   a. If a study is conducted at a non-regulated site (e.g. school), the SRC reviews the Research Plan/Project Summary.
   b. If the study was conducted at a Regulated Research Institution, and was approved by the appropriate institutional board (e.g. IBC, IACUC), the SRC reviews the institutional forms provided and documents SRC approval (Form(6A)).
   c. If a PHBA study was conducted at a Regulated Research Institution but the institution does not require review for this type of study. The SRC must review the study and document approval on Form 6A that the student received appropriate training and the project complies with Intel ISEF rules.

Classification of Biological Agents Risk Groups

Biological agents, plant or animal, are classified according to biosafety level risk groups. These classifications presume ordinary circumstances in the research laboratory, or growth of agents in small volumes for diagnostic and experimental purposes.

BSL-1 risk group contains biological agents that pose low risk to personnel and the environment. These agents are highly unlikely to cause disease in healthy laboratory workers, animals or plants. The agents require Biosafety Level 1 containment. Examples of BSL-1 organisms are: *Agrobacterium tumefaciens*, *Micrococcus leuteus*, *Neurospora crassa*, *Bacillus subtilis*.

BSL-2 risk group contains biological agents that pose moderate risk to personnel and the environment. If exposure occurs in a laboratory situation, the risk of spread is limited and it rarely would cause infection that would lead to serious disease. Effective treatment and preventive measures are available in the event that an infection occurs. The agents require Biosafety Level 2 containment. Examples of BSL-2 organisms are: Mycobacterium, *Streptococcus pneumoniae, Salmonella choleraesui*s.

BSL-3 risk group contains biological agents that usually cause serious disease (human, animal or plant) or that can result in serious economic consequences. Projects in the BSL-3 group are prohibited.

BSL-4 risk group contains biological agents that usually produce very serious disease (human, animal or plant) that is often untreatable. Projects in the BSL-4 group are prohibited.

Levels of Biological Containment

There are four levels of biological containment (Biosafety Level 1–4). Each level has guidelines for laboratory facilities, safety equipment and laboratory practices and techniques.

BSL-1 containment is normally found in water-testing laboratories, in high schools, and in colleges teaching introductory microbiology classes. Work is done on an open bench or in an appropriate biosafety hood. Standard microbiological practices are used when working in the laboratory. Decontamination can be achieved by treating with chemical disinfectants or by steam autoclaving. Lab coats and gloves are required. The laboratory work is supervised by an individual with general training in microbiology or a related science.

BSL-2 containment is designed to maximize safety when working with agents of moderate risk to humans and the environment. Access to the laboratory is restricted. Biological safety cabinets (Class 2, type A, BSC) must be available. An autoclave should be readily available for decontaminating waste materials. Lab coats and gloves are required; eye protection and face shields must also be worn as needed. The laboratory work must be supervised by a scientist who understands the risk associated with working with the agents involved.

BSL-3 containment is required for infectious agents that may cause serious or potentially lethal diseases as a result of exposure by inhalation. Projects in the BSL-3 group are prohibited.

BSL-4 containment is required for dangerous/exotic agents that pose high risk of life-threatening disease. Projects in the BSL-4 group are prohibited.

Hazardous Chemicals, Activities or Devices Rules

Includes DEA-controlled substances, prescription drugs, alcohol & tobacco, firearms and explosives, radiation, lasers, etc.

The following rules apply to research using hazardous chemicals, devices and activities. These include substances and devices that are regulated by local, state, country, or international law, most often with restrictions of their use by minors such as DEA-controlled substances, prescription drugs, alcohol, tobacco, firearms and explosives. Hazardous activities are those that involve a level of risk above and beyond that encountered in the student's everyday life.

These rules are intended to protect the student researcher by ensuring proper supervision and the consideration of all potential risks so that the appropriate safety precautions are taken. Students are required to meet all standards imposed by Intel ISEF, school, local, and/or regional fair(s).

Rules for ALL Projects Involving Hazardous Chemicals, Activities and Devices

1. The use of hazardous chemicals and devices and involvement in hazardous activities require direct supervision by a Designated Supervisor, except those involving DEA-controlled substances, which require supervision by a Qualified Scientist.

2. The student researcher must conduct a risk assessment in collaboration with a Designated Supervisor or Qualified Scientist prior to experimentation. This risk assessment is documented on the Risk Assessment Form 3.

3. Student researchers must acquire and use regulated substances in accordance with all local, state, U.S. federal and country laws. For further information or classification for these laws and regulations, contact the appropriate regulatory agencies.

4. For all chemicals, devices or activities requiring a Federal and/or State Permit, the student/supervisor must obtain the permit prior to the onset of experimentation. A copy of the permit must be available for review by adults supervising the project and the local, affiliated, and Intel ISEF SRCs in their review prior to competition.

5. The student researcher must minimize the impact of an experiment on the environment. Examples include using minimal quantities of chemicals that will require subsequent disposal; ensuring that all disposal is done in an environmentally safe manner and in accordance with good laboratory practices.

6. The following forms are required:
   a. Checklist for Adult Sponsor (1), Student Checklist (1A), Research Plan/Project Summary and Approval Form (1B)
   b. Regulated Research Institution Form (1C), when applicable
   c. Qualified Scientist Form (2), when applicable
   d. Risk Assessment Form (3)

Additional Rules for Specific Regulated Substances

There are additional rules for the following regulated substances:

- DEA-controlled Substances
- Prescription Drugs
- Alcohol & Tobacco
- Firearms and Explosives
- Drones

1. DEA-Controlled Substances

The U.S. Drug Enforcement Administration (DEA) regulates chemicals that can be diverted from their intended use to make illegal drugs. Other countries may have similar regulatory bodies; students outside of the U.S. must adhere to their own country's drug regulatory agency requirements in addition to U.S. DEA regulations. DEA-controlled substances and their schedule number are at the DEA website under Sources of Information. It is the responsibility of the student to consult this list if there is a possibility that substances used in experimentation could be regulated.

a. All studies using DEA-controlled substances must be supervised by a Qualified Scientist who is licensed by the DEA (or other international regulatory body) for use of the controlled substance.
b. All studies using DEA Schedule 1 substances (including marijuana) must have the research protocol approved by DEA before research begins. Schedule 2, 3 and 4 substances do not require protocol approval by DEA.

2. Prescription Drugs

Prescription drugs are drugs regulated by federal or country laws to protect against inappropriate or unsafe use. Special precautions must be taken in their use for a science project as follows:

a. Students are prohibited from administering prescription drugs to human participants.
b. A veterinarian must supervise student administration of any prescription drugs to vertebrate animals.

3. Alcohol and Tobacco

The U.S. Alcohol and Tobacco Tax and Trade Bureau (TTB) regulates the production of alcohol and distribution of alcohol and tobacco products. Many such products are restricted by age for purchase, possession and consumption.

a. Fermentation studies in which minute quantities of ethyl alcohol are produced are permitted.
b. The Designated Supervisor is responsible for the acquisition, usage and appropriate disposal of the alcohol or tobacco used in the study.
c. Production of wine or beer by adults is allowable in the home and must meet TTB home production regulations. Students are allowed to design and conduct a research project, under direct parental supervision, involving the legal production of the wine or beer.
d. Students are prohibited from conducting experiments where consumable ethyl alcohol is produced by distillation. However, students are allowed to distill alcohol for fuel or other non-consumable products. To do so, the work must be conducted at school or a Regulated Research Institution and follow all local and country laws. See Alcohol and Tobacco Tax and Trade Bureau (TTB) website for details.

4. Firearms and Explosives

The U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), along with state agencies, regulates the purchase and use of firearms and explosives. A firearm is defined as a small arms weapon from which a projectile is fired by gunpowder. An explosive is any chemical compound, mixture or device, the primary purpose of which is to function by explosion. Explosives include, but are not limited to, dynamite, black powder, pellet powder, detonators, and igniters.

The purchase of a firearm by a minor is generally unlawful. The use of a firearm, without proper state certification, is illegal. Students should check the training and certification requirements of individual states and countries.

a. Projects involving firearms and explosives are allowable when conducted with the direct supervision of a Designated Supervisor and when in compliance with all federal, state and local laws.
b. A fully assembled rocket motor, reload kit or propellant modules containing more than 62.5 grams of propellant are subject to the permitting, storage and other requirements of federal explosive laws and regulations.
c. Potato guns and paintball guns are not considered firearms unless they are intended to be used as weapons. However, they must be treated as hazardous devices.

5. Drones

Projects involving unmanned aircraft systems (UAS)/drones must follow all state, Federal and country laws. See the Federal Aviation Administration (FAA) for more details (www.faa.gov.uas/registration).

Guidance for Risk Assessment

Please find below guidance on conducting risk assessment when using the following:

- Hazardous Chemicals
- Hazardous Devices
- Radiation

1. Hazardous Chemicals

A proper risk assessment of chemicals must include review of the following factors:

a. Toxicity – the tendency of a chemical to be hazardous to health when inhaled, swallowed, injected or in contact with the skin.
b. Reactivity - the tendency of a chemical to undergo chemical change.
c. Flammability - the tendency of a chemical to give off vapors which readily ignite when used under normal working conditions.
d. Corrosiveness - the tendency of a chemical, upon physical contact, to harm or destroy living tissues or physical equipment.

When assessing risk, the type and amount of exposure to a chemical must be considered. For example, an individual's allergic and genetic disposition may have an influence on the overall effect of the chemical. The student researcher must refer to Safety Data Sheets provided by the vendor (SDS) to ensure that proper safety precautions are taken. Some SDS sheets (e.g., Flinn) rank the degree of hazard associated with a chemical. This rating may assist students and adult sponsors in determining risk associated with the use of a chemical.

A risk assessment must include proper disposal methods for the chemicals used in an experiment. The Flinn Catalog (referenced in the Sources of Information section) provides information for the proper disposal of chemicals. If applicable, the student researcher must incorporate in the research plan disposal procedure required by federal and state guidelines.

Environmentally Responsible Chemistry

The mission of environmentally responsible (green) chemistry is to avoid the use or production of hazardous substances during chemical process. The principles of green chemistry are described on the EPA website in the Sources of Information section. Whenever possible the following principles should be incorporated into the research plan.

- Waste prevention
- Use of the safest possible chemicals and products
- Design of the least possible hazardous chemical syntheses
- Use renewable materials
- Use catalysts in order to minimize chemical usage
- Use of solvents and reaction conditions that are safe as possible
- Maximization of energy efficiency
- Minimization of accident potential

2. Hazardous Devices

The documentation of risk assessment (Form 3) is required when a student researcher works with potentially hazardous/dangerous equipment and/or other devices, in or outside a laboratory setting that require a moderate to high level of expertise to ensure their safe usage. Some commonly used devices (Bunsen burners, hot plates, saws, drills, etc.) may not require a documented risk assessment, assuming that the student researcher has experience working with the device. Use of other potentially dangerous devices such as high vacuum equipment, heated oil baths, NMR equipment, and high temperature ovens must have documentation of a risk assessment. It is recommended that all student designed inventions also have documentation of a risk assessment.

3. Radiation

A risk assessment must be conducted when a student's project involves radiation beyond that normally encountered in everyday life. Non-ionizing radiation includes the spectrum of ultraviolet (UV), visible light, infrared (IR), microwave (NW), radiofrequency (RF) and extremely low frequency (ELF). Ionizing radiation has enough energy to remove tightly bound electrons from atoms, thus creating ions. Examples include high frequency UV, X-Rays, and gamma rays.

Lasers usually emit visible, ultraviolet or infrared radiation. Lasers are classified into four classes based upon their safety. Manufacturers are required to label Classes II – IV lasers

Projects involving radionuclides (radioisotopes) and X-rays must involve a careful examination of the risks associated with the study and appropriate safety precautions must be taken. Depending upon the level of exposure, radiation released from these sources can be a health hazard.

A risk assessment must take into account the time of exposure, distance and shielding involved in the study.

a. A study of natural radiation that is no more than encountered in everyday life is exempt from the following requirements.
b. All studies may not exceed the dose limits set by the Nuclear Regulatory Commission of 0.5 mrem/hr or 100 mrem/year of exposure.
c. If the voltage needed in the study is <10 kvolts, a risk assessment must be conducted. The study may be done at home or school, and SRC preapproval is not required.
d. A study using 10-25 kvolts must have a risk assessment conducted and must be preapproved by the SRC to

assess safety. Such a study must be conducted in a metal chamber using a camera only, not direct view through glass. A dosimeter or radiation survey meter is required to measure radiation exposure.

e. All studies using > 25 kvolts must be conducted at an institution with a Licensed Radiation Program and must be preapproved by the Institutions' Radiation Safety Officer or the Committee which oversees the use of ionizing radiation to ensure compliance with state and federal regulations.

Sources of Information for All Projects

1. United States Patent and Trade Office
   Customer Service: 1-800-786-9199 (toll-free); 571-272-1000 (local); 571-272-9950 (TTY)
   www.uspto.gov/
   www.uspto.gov/patents/process/index.jsp

2. European Patent Office
   www.epo.org/
   www.epo.org/applying/basics.html

3. The Mad Scientist Network at Washington University School of Medicine:
   www.madsci.org

4. ANS Task Force
   www.anstaskforce.gov

   Aquatic Nuisance Species (ANS) Task Force
   www.anstaskforce.gov
   www.anstaskforce.gov/Documents/ISEF.pdf

5. APHIS
   www.aphis.usda.gov/
   Animal and Plant Health Inspection Service
   Invasive Species List

6. Invasive Species Specialist Group
   www.issg.org
   The Global Invasive Species database contains invasive species information supplied by experts from around the world.

7. Invasive Species Information
   www.invasivespeciesinfo.gov/resources/lists.shtml
   Provides information for species declared invasive, noxious, prohibited, or harmful or potentially harmful.

8. *Success with Science: The Winner's Guide to High School Research*
   Gaglani, S. and DeObaldia, G. (2011). Research Corporation for Science Advancement.
   ISBN 0-9633504-8-X

Human Participants

1. Code of Federal Regulation (CFR), Title 45 (Public Welfare), Part 46-Protection of Human Subjects (45CFR46)
   http://ohsr.od.nih.gov/guidelines/45cfr46.html

2. Dunn, C. M. and Chadwick, G. L., *Protecting Study Volunteers in Research,* 3rd Edition (2004). Boston, MA: Thomson Centerwatch. ISBN 1-930624-44-1.
   Can be purchased from:
   www.amazon.com

3. NIH tutorial, "Protecting Human Research Participants"
   http://phrp.nihtraining.com/users/PHRP.pdf

4. Belmont Report, April 18, 1979
   www.hhs.gov/ohrp/humansubjects/guidance/belmont.html

5. *Standards for Educational and Psychological Testing. (1999).* Washington, DC: AERA, APA, NCME.
   www.apa.org/science/programs/testing/standards.aspx

6. American Psychological Association
   750 First Street, NE Washington, DC 20002-4242
   phone: 202-336-5500; 800-374-2721
   www.apa.org

   Information for students:
   www.apa.org/science/leadership/students/information.aspx
   Information regarding publications:
   www.apa.org/pubs/index.aspx

7. Educational and Psychological Testing
   Testing Office for the APA Science Directorate
   phone: 202-336-6000
   email: testing@apa.org
   www.apa.org/science/programs/testing/index.aspx

8. The Children's Online Privacy Protection Act of 1998 (COPPA) (15 U.S.C. §§ 6501–6506)
   www.ftc.gov/privacy/coppafaqs.shtm

Vertebrate Animals
Animal Care and Use

1. *Laboratory Animals,* Institute of Laboratory Animal Research (ILAR), Commission on Life Sciences, National Research
   http://dels.nas.edu/ilar

2. *Guide for the Care and Use of Laboratory Animals, 8th Edition (2011)*
   http://grants.nih.gov/grants/olaw/Guide-for-the-Care-and-Use-of-Laboratory-Animals.pdf
   www.nap.edu/catalog.php?record_id=12910

3. *Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research* (2003), Institute for Laboratory Animal Research (ILAR).
   dels.nas.edu/report/guidelines-carey/10732

   To order these ILAR publications contact:
   National Academies Press
   500 Fifth Street, NW
   Washington, DC 20055
   phone: 888-624-8373 or 202-334-3313; fax: 202-334-2451
   www.nap.edu

4. Federal Animal Welfare Act (AWA)
   7 U.S.C. 2131-2157
   Subchapter A - Animal Welfare (Parts I, II, III)
   www.nal.usda.gov/awic/legislat/awicregs.htm

   Above document is available from:
   USDA/APHIS/AC
   4700 River Road, Unit 84
   Riverdale, MD 20737-1234
   email: ace@aphis.usda.gov
   phone: 301-734-7833; fax: 301-734-4978
   http://awic.nal.usda.gov

5. *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (Agri-Guide)*
Federation of Animal Science Societies (FASS)
1800 S. Oak Street, Suite 100
Champaign, IL 61820-6974
phone: 217-356-3182
email: fass@assochq.org
www.fass.org

6. *Guidelines for the Use of Fish in Research* (2014), American Fisheries Society.
www.fisheries.org
www.fisheries.org/afs/docs/policy_16.pdf

7. Euthanasia Guidelines
AVMA Guidelines on Euthanasia (2013)
American Veterinary Medical Association
www.avma.org/KB/Policies/Documents/euthanasia.pdf

Alternative Research and Animal Welfare

1. The National Library of Medicine provides computer searches through MEDLINE:
Reference & Customer Services
National Library of Medicine
8600 Rockville Pike
Bethesda, MD 20894
888-FIND-NLM or 888-346-3656; 301-594-5983;
email: info@ncbi.nlm.nig.gov
www.nlm.nih.gov
www.ncbi.nlm.nih.gov/sites/entrez

2. National Agriculture Library (NAL) provides reference service for materials that document a) Alternative Procedures to Animal Use and b) Animal Welfare.
Animal Welfare Information Center
National Agriculture Library
10301 Baltimore Avenue, Room 410
Beltsville, MD 20705-2351
phone: 301-504-6212, fax: 301-504-7125
email: awic@ars.usda.gov
www.nal.usda.gov/awic

3. Institute of Laboratory Animal Resources (ILAR) provides a variety of information on animal sources, housing and handling standards, and alternatives to animal use through annotated bibliographies published quarterly in ILAR Journal.
ILAR - The Keck Center of the National Academies
500 Fifth Street, NW, Keck 687
Washington, DC 20001
phone: 202-334-2590, fax: 202-334-1687
email: ILAR@nas.edu
http://dels.nas.edu/ilar

4. Quarterly bibliographies of Alternatives to the Use of Live Vertebrates in Biomedical Research and Testing may be obtained from:
Specialized Information Services
NLM/NIH
2 Democracy Plaza, Suite 510
6707 Democracy Blvd., MSC 5467
Bethesda, MD 20892-5467
phone: 301-496-1131; Fax: 301-480-3537
email: tehip@teh.nlm.nih.gov
www.sis.nlm.nih.gov;
http://toxnet.nlm.nih.gov/altbib.html

5. Johns Hopkins Center for Alternatives to Animal Testing (CAAT) has worked with scientists since 1981 to find new methods to replace the use of laboratory animals in experiments, reduce the number of animals tested, and refine necessary tests to eliminate pain and distress.
email: caat@jhsph.edu
http://caat.jhsph.edu/

6. Quality Assurance Manuals (for appropriate species)
Such as:
Poultry: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELDEV3002393
Beef: http://www.bqa.org/manuals.aspx
Pork: http://old.pork.org/filelibrary/youthpqaplus/ypqamanual.pdf

Potentially Hazardous Biological Agents

1. American Biological Safety Association: ABSA Risk Group Classification – list of organisms
www.absa.org

2. American Type Culture Collection (ATCC)
www.atcc.org

3. Bergey's Manual of Systematic Bacteriology website – follow the links for resources and microbial databases for a collection of international websites of microorganisms and cell cultures.
www.bergeys.org/resources.html

4. Biosafety in Microbiological and Biomedical Laboratories (BMBL) - 4th Edition. Published by CDC-NIH,
www.cdc.gov/biosafety/publications/bmbl5/BMBL.pdf

5. World Health Organization Laboratory Safety Manual
www.who.int/diagnostics_laboratory/guidance/en/

6. Canada – Agency of Public Health – list of non-pathogenic organisms
www.phac-aspc.gc.ca/lab-bio/index_eng.php
www.phac-aspc.gc.ca/lab-bio/res/index-eng.php

7. Microorganisms for Education Website – list of organisms
www.science-projects.com/safemicrobes.htm

8. *NIH Guidelines for Research Involving Recombinant DNA Molecules. Published by National Institutes of Health.*
http://osp.od.nih.gov/office-biotechnology-activities/oba/index.html

9. OSHA – Occupational Health and Safety Administration
www.osha.gov

Hazardous Chemicals, Activities or Devices

General Lab/Chemical Safety

1. *Safety in Academic Chemistry Laboratories, Volumes 1 and 2, 2003.* Washington, DC: American Chemical Society.
Order from (first copy free of charge):
American Chemical Society
Publications Support Services
1155 16th Street, NW
Washington, DC 20036
phone: 202-872-4000 or 800-227-5558
email: help@acs.org,
www.acs.org/education

2. General
   Howard Hughes Medical Institute has resources for working with cell cultures, radioactive materials and other laboratory materials.
   www.hhmi.org/resources/

3. Environmental Protection Agency (EPA) website for green chemistry
   www.epa.gov/greenchemistry

4. Safety and Data Sheets (SDS)
   www.flinnsci.com/msds-search.aspx
   A directory of SDS sheets from Flinn Scientific Inc. that includes a ranking of hazard level and disposal methods.

   www.ilpi.com/msds/index.html - A listing of numerous sites that have free downloads of MSDS sheets.

5. Pesticides
   National Pesticide Information Center
   http://npic.orst.edu/ingred/products.html
   Describes the various types of pesticides and the legal requirements for labelling. Provides links and phone numbers to get additional information.

   Environmental Protection Agency
   http://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1
   A database of product labels. Enter the product name or company name to view the approved label information of pesticides which are registered with the agency.

6. DEA Controlled Substances
   Drug Enforcement Agency website:
   www.justice.gov/dea/index.htm
   Controlled Substance Schedules – a list of controlled substances:
   www.deadiversion.usdoj.gov/schedules/

7. Alcohol, Tobacco, Firearms, and Explosives
   Alcohol and Tobacco Tax and Trade Bureau
   www.ttb.gov/
   Bureau of Alcohol, Tobacco, Firearms and Explosives
   www.atf.gov

8. Radiation
   Radiation Studies Information (CDC)
   www.cdc.gov/nceh/radiation/default.htm

9. CDC Laboratory Safety Manuals
   www.cdc.gov/biosafety/publications/index.htm

10. Occupational Safety and Health Administration
    www.osha.gov
    Safety and Health Topics:
    www.osha.gov/SLTC/
    www.osha.gov/SLTC/reactivechemicals/index.html
    www.osha.gov/SLTC/laserhazards/index.html
    www.osha.gov/SLTC/radiationionizing/index.html

11. U.S. Nuclear Regulatory Commission
    Material Safety and Inspection Branch
    One White Flint North
    11555 Rockville Pike
    Rockville, MD 20852
    phone: 301-415-8200; 800-368-5642
    www.nrc.gov

2017 New York City Science & Engineering Fair
Display Rules and Guidelines – Display Rules & Guidelines

The following Display Rules and Guidelines are to be used for presenting at the New York City Science and Engineering Fair (NYCSEF) and are intended for the safety of students presenting at all NYCSEF events. Note: Some regulations differ from those listed by the Intel ISEF Display and Safety Guidelines.

General Requirements

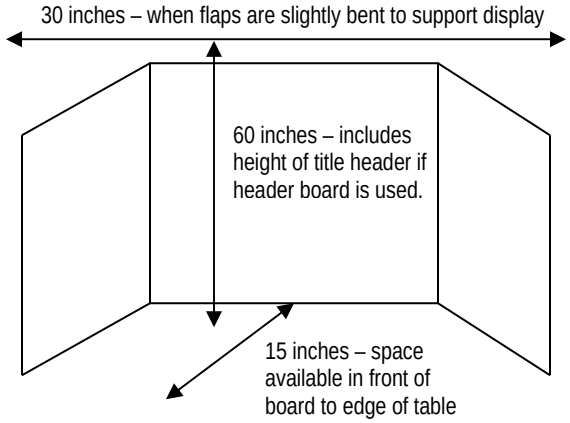
NYCSEF staff is the final authority on display and safety issues for projects entered in all NYCSEF events. Occasionally, NYCSEF staff may require students to make revisions to their displays to conform to the rules and guidelines specified below. Decisions made by the NYCSEF Scientific Review Committee and NYCSEF staff are final.

Maximum Size of Project

It is recommended that students prepare a three panel presentation board (see diagram below) that can be set up without additional supports on top of a table. Students choosing to prepare their project board as a single printed sheet must also supply their own support mechanism (i.e. a blank three-panel presentation board). There will be no easels or other display stands available at the NYCSEF events.

Display Dimensions

15 inches (38 centimeters) deep front to back
30 inches (76 centimeters) side to side
60 inches (152 centimeters) table top to top of poster display



At NYCSEF, students will be required to set up their poster presentations on top of tables provided in a designated area. Typically four projects are assigned to share space on a five foot rectangular table. Maximum display sizes include all project materials and supports and should adhere to these dimensions after final set-up. If a title board (header board) is used, it becomes part of the overall display board and therefore, must not exceed the allowed dimensions.

Any project component used by the student for demonstration purposes must be done within the confines of the space provided at the event – this includes any demonstration apparatus or object (e.g. model, laptop, computer screen, etc). When not being used, all demonstration materials must be removed as to not interfere with presentations made by neighboring students.

Not Allowed at Project Display

1. Living organisms, including plants.
2. Taxidermy specimens or parts.
3. Preserved vertebrate or invertebrate animals.
4. Human or animal food.
5. Human / animal parts or body fluids (i.e. blood, urine, etc).
6. Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (exception: manufactured construction materials used in building the project or display).
7. All chemicals including water (exceptions: water integral to an enclosed apparatus or water supplied for consumption).
8. All hazardous substances or devices (i.e. poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers - including laser pointers).
9. Dry ice or other sublimating solids.
10. Sharp items (i.e. syringes, needles, pipettes, knives, etc.).
11. Flames or highly flammable materials.
12. Batteries with open-top cells.
13. Photographs or other visual presentations depicting vertebrate animals in surgical

techniques, dissections, necropsies, or other lab procedures.
14. Active internet or email connections as part of displaying or operating the project.
15. Prior years' written material or visual depictions on the display board. Prior years' data books—not research papers—can be present but only as a reference and must not be part of the display.
16. Glass or glass objects (exception: glass that is an integral part of a commercial product such as a computer screen).
17. Any apparatus deemed unsafe by the NYCSEF Scientific Review Committee or NYCSEF event staff.
18. Postal addresses, business cards, World Wide Web, e-mail, and/or social media addresses, OR codes, telephone, and/or fax numbers of a competing participant.

Allowed at Project Display with Restrictions Indicated

1. Soil, rocks, and/or waste samples if permanently encased in a slab of acrylic.
2. Photographs and/or visual depictions if:
    a. They are not deemed offensive or inappropriate by NYCSEF staff. This includes, but is not limited to visually offensive photographs or visual depictions of invertebrate or vertebrate animals.
    b. They have credit lines of origin ("Photograph taken by..." or "Image taken from…").
    c. They are from the internet, magazines, newspapers, journals, etc, and credit lines are attached.
    d. They are photographs or visual depictions of the competing participant(s).
    e. They are photographs of human subjects for which signed consent forms are with the project display. (Human Subject Form 4 or equivalent must include photograph release consent signed by the subject.)
3. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points if for display only and not operated.
4. Class III and IV lasers if for display only and NOT operated.
5. Any apparatus producing temperatures that will cause physical burns must be adequately insulated.

Electrical Regulations at NYCSEF

1. Students requesting access to electric outlets must indicate this request on the NYCSEF online application form. NYCSEF cannot guarantee access to electric outlets on the day of competition without this request.
2. Students requiring access to electric outlets must supply their own **UL-Listed** 3-wire extension cord which is appropriate for the load and equipment.
3. Electrical power that will be supplied at the NYCSEF event is **120 Volt A.C., single phase, 60 cycle**. Maximum circuit amperage/wattage available is determined by the electrical circuit capacities of the exhibit hall and may be adjusted on-site by NYCSEF or event staff. For all electrical regulations, "**120 Volt A.C**." is intended to encompass the corresponding range of voltage as supplied by the facility in which the NYCSEF events are being held.
4. All electrical connectors, wiring, switches, extension cords, fuses, etc. must be **UL-listed** and must be appropriate for the load and equipment. Connections must be soldered or made with **UL-listed** connectors. Wiring, switches, and metal parts must have adequate insulation and over-current safety devices (such as fuses) and must be inaccessible to anyone other than the student. Exposed electrical equipment or metal that possibly may be energized must be shielded with a non-conducting material or with a grounded metal box to prevent accidental contact.
5. Wiring not part of a commercially available **UL-listed** appliance or piece of equipment must have a clearly visible fuse or circuit breaker on the supply side of the power source and prior to any project equipment.
6. There must be an accessible, clearly visible on/off switch or other means of disconnect from the **120 Volt** power source.
7. Any lighting that generates considerable and excessive amounts of heat (high-intensity lamps, certain halogen lights, etc) will not be permitted in the exhibit hall. Students may be asked to remove such lighting if deemed excessive by NYCSEF or event staff at the competition.

Other NYCSEF Information and Requirements

1. Students must be physically present at their projects in the exhibit hall during the designated judging times. Failure to do so may result in the project not being judged.

2. All students MUST register and set up their project displays in person for each level of competition – this includes all members of a Team Project. Students needing special consideration or accommodations must request so, in writing, to NYCSEF staff PRIOR to the event dates. All decisions will be made on a case by case basis.
3. NYCSEF staff reserve the right to remove any project for safety reasons or to protect the integrity of the NYCSEF events and its rules and regulations. NYCSEF staff will remove the project in the safest manner possible but is not responsible for damage to the project.
4. A project data book, lab notebook, and/or research paper are not required to be displayed at the NYCSEF events; however, they may be helpful for judges. A student research paper is required for submission with the NYCSEF application.
5. Students will **NOT** be allowed to distribute any disks, CDs, printed materials, pamphlets, etc. (**EXCEPT abstracts**) to judges or the public during the NYCSEF events. Students may distribute project abstracts but must supply their own copies. No copies will be made for students on the day of the events. Any materials for distribution other than project abstracts will be confiscated and discarded by NYCSEF staff.
6. Project sounds, lights, odors, or any other display items must not be distracting.
7. No food or drinks, except small containers of bottled water for personal consumption, are allowed in the Exhibit Hall.
8. Students are responsible for the removal of their project boards and any other display material used during the NYCSEF events. Failure to do so will result in these materials being discarded at the conclusion of the day's event.
9. The New York City Department of Education and the City University of New York are not responsible for any loss or damage to project displays or materials.

Display Suggestions

Students preparing their poster displays and presentations should consider the following:

- Poster displays should attract and inform – but NOT distract.
- Make it easy for interested spectators and judges to assess the study and the results obtained.
- Make the most of the available space using clear and concise language and visuals.
- The title is an extremely important attention grabber and should simply and accurately present the research and depict the nature of the project.
- Make sure the display follows a sequence and is logically presented and easy to read.
- Use neat colorful headings, charts and graphs to present your project. Pay special attention to the labeling of graphs, charts, diagrams and tables.
- Be sure to adhere to the size limitations and safety rules described above when preparing the poster display.

Keep in mind - the judges are judging the research project, not the display. However, as a visual summary of the research, the display should be neat and describe the major work of the project without significant verbal explanation.

New York City Science & Engineering Fair
Categories and Subcategories

The following categories are to be used for the 2017 New York City Science and Engineering Fair. In some cases, categories and subcategories have been combined for the purposes of the NYCSEF events and differ from those used in the Intel ISEF; a full description of the Intel ISEF categories can be found on the ISEF website.

ANIMAL SCIENCES
Development
Ecology
Animal Husbandry
Pathology
Physiology
Population Genetics
Systematics
Other

BEHAVIORIAL & SOCIAL SCIENCES
Clinical & Developmental Psychology
Cognitive Psychology
Physiological Psychology
Sociology
Other

BIOCHEMISTRY
General Biochemistry
Metabolism
Structural Biochemistry
Other

CELLULAR & MOLECULAR BIOLOGY
Cellular Biology
Cellular &Molecular Genetics
Immunology
Molecular Biology
Other

CHEMISTRY
Analytic Chemistry
Analytical Chemistry
General Chemistry
Inorganic Chemistry
Organic Chemistry
Physical Chemistry
Other

COMPUTER SCIENCE
Algorithms, Data Bases
Artificial Intelligence
Networking & Communications

Computational Science, Computer Graphics
Software Engineering, Programming Languages
Computer System, Operating System
Other

ENGINEERING
Aerospace & Aeronautical Engineering
Bioengineering
Civil Engineering
Chemical Engineering
Computer Engineering
Computer & Electrical Engineering
Controls
Energy & Transportation
Industrial Engineering
Mechanical Engineering
Material Science
Robotics
Other

ENVIRONMENTAL & EARTH SCIENCES
Air Pollution & Air Quality
Climatology & Weather
Ecosystems Management
Environmental Engineering
Geochemistry & Mineralogy
Historical Paleontology
Land Resource Management
Recycling & Waste Management
Soil Contamination & Soil Quality
Tectonics
Water Contamination & Water Quality
Other

MATHEMATICAL SCIENCE
Analysis
Applied Mathematics
Probability
Other

MEDICINE & HEALTH SCIENCES
Disease Diagnosis & Treatment Epidemiology
Genetics
Molecular Biology of Diseases
Physiology & Pathophysiology
Other

MICROBIOLOGY
Antibiotics
Antimicrobials
Bacteriology
Microbial Genetics
Virology
Other

PHYSICS & SPACE
Atoms, Molecules, Solids
Astronomy
Biological Physics
Geophysics
Instrumentation and Electronics
Magnetics and Electromagnetics
Nuclear and Particle Physics
Optics, Lasers, Masers
Planetary Science
Theoretical Physics, Theoretical or Computational Astronomy
Other

PLANT SCIENCES
Agriculture/Agronomy
Development
Ecology
Photosynthesis
Plant Genetics
Plant Physiology
Plant Systematics, Evolution
Other

2017 New York City Science and Engineering Fair
SIGNATURE PAGE – PRINT clearly. Use BLUE or BLACK ink.

Project Title: _____

_____

Category: _____

Student Name(s) and **School**: _____

NOTE: In order to successfully apply for NYCSEF 2017, students must submit:

1) ONE (1) printout of the NYCSEF On-line application Confirmation Form
2) ONE (1) set of the signed NYCSEF required and supplemental forms (where applicable)
3) TWO (2) copies of the research paper

All must be POSTMARKED by **December 14, 2016**

Only students who follow the proper rules and guidelines and submit ALL necessary materials will be eligible to have their application reviewed by the NYCSEF Scientific Review Committee and be considered for competition in any of the NYCSEF events.

Acknowledgement of Participation:

a. Student and Parent/Guardian Acknowledgement:

We certify that we are aware of and adhere to all the rules to participate in the New York City Science and Engineering Fair (NYCSEF) as stated in the NYCSEF Rules and Guidelines. I (We) understand all of the risks and dangers that may be inherent in conducting research; that this project complies with all the regulations as described in the rules and guidelines, including safety and size limitations; and that failure to comply with these guidelines may result in the failure to qualify for competition. I (We) certify that the enclosed application is complete and that ALL requested information has been submitted to the best of my (our) knowledge. I (We) further certify that this project is the work of the applicant(s); that all projects will be set up and removed only during specified hours at exhibit sites; and exhibited with parental consent. We understand that images and/or photographs may be taken during the event and give permission for CUNY to use them for non-commercial purposes for the promotion of NYCSEF. I (we) understand that I (we) may be selected to attend the International Science and Engineering Fair and represent NYC in Los Angles, CA from May 7-12, 2017. I (We) understand that the New York City Department of Education and the City University of New York are not responsible for any loss or damage to projects or project displays.

Student #1 Name	Signature	Date	Parent/Guardian Name	Signature	Date
Student #2 Name	Signature	Date	Parent/Guardian Name	Signature	Date
Student #3 Name	Signature	Date	Parent/Guardian Name	Signature	Date

b. Science/Research Teacher Approval: I have read and reviewed all the material submitted for this research project application. I agree to sponsor the student(s) named above and assume reasonable responsibility for compliance with all New York City Science and Engineering Fair rules and guidelines as they pertain to this application and that failure to comply may result in disqualification of the student(s).

Printed Name (Title)	Signature	Date

c. Principal Approval: I agree to support the student(s) named above for entry to the New York City Science and Engineering Fair and to have these student(s) represent my school at all levels of this competition.

Printed Name (Title)	Signature	Date

Checklist for Adult Sponsor (1)

This completed form is required for ALL projects.

To be completed by the Adult Sponsor in collaboration with the student researcher(s):

Student's Name(s):_____

Project Title: _____

1. ☐ I have reviewed the Intel ISEF Rules and Guidelines.
2. ☐ I have reviewed the student's completed Student Checklist (1A) and Research Plan/Project Summary.
3. ☐ I have worked with the student and we have discussed the possible risks involved in the project.
4. ☐ The project involves one or more of the following and requires prior approval by an SRC, IRB, IACUC or IBC:
   - ☐ Humans
   - ☐ Vertebrate Animals

   Potentially Hazardous Biological Agents
   - ☐ Microorganisms ☐ rDNA ☐ Tissues

5. ☐ Items to be completed for **ALL PROJECTS**
   - ☐ Adult Sponsor Checklist (1)
   - ☐ Student Checklist (1A)
   - ☐ Research Plan/Project Summary
   - ☐ Approval Form (1B)
   - ☐ Regulated Research Institutional/Industrial Setting Form (1C) (when applicable; after completed experiment)
   - ☐ Continuation/Research Progression Form (7) (when applicable)

6. **Additional forms required if the project includes the use of one or more of the following** (check all that apply):
   - ☐ **Humans** (Requires prior approval by an Institutional Review Board (IRB); see full text of the rules.)
   - ☐ **Testing student designed invention/prototype**
     - ☐ Human Participants Form (4) or appropriate Institutional IRB documentation
     - ☐ Sample of Informed Consent Form (when applicable and/or required by the IRB)
     - ☐ Qualified Scientist Form (2) (when applicable and/or required by the IRB)
   - ☐ **Vertebrate Animals** (Requires prior approval, see full text of the rules.)
     - ☐ Vertebrate Animal Form (5A) - for projects conducted in a school/home/field research site (SRC prior approval required.)
     - ☐ Vertebrate Animal Form (5B) - for projects conducted at a Regulated Research Institution. (Institutional Animal Care and Use Committee (IACUC) approval required prior experimentation.)
     - ☐ Qualified Scientist Form (2) (Required for all vertebrate animal projects at a regulated research site or when applicable)
   - ☐ **Potentially Hazardous Biological Agents** (Requires prior approval by SRC, IACUC or Institutional Biosafety Committee (IBC), see full text of the rules.)
     - ☐ Potentially Hazardous Biological Agents Risk Assessment Form (6A)
     - ☐ Human and Vertebrate Animal Tissue Form (6B) - to be completed in addition to Form 6A when project involves the use of fresh or frozen tissue, primary cell cultures, blood, blood products and body fluids.
     - ☐ Qualified Scientist Form (2) (when applicable)
   - ☐ **Hazardous Chemicals, Activities and Devices** (No SRC prior approval required, see full text of the rules.)
     - ☐ Risk Assessment Form (3)
     - ☐ Qualified Scientist Form (2) (required for projects involving DEA-controlled substances or when applicable)

Note: The following are exempt from prior review but require a Risk Assessment Form 3: projects involving protists, archae and similar microorganisms, for projects using manure for composting, fuel production or other non-culturing experiments, for projects using color change coliform water test kits, microbial fuel cells, and for projects involving decomposing vertebrate organisms.

Adult Sponsor's Printed Name	Signature	Date of Review
Phone	Email	

2017 New York City Science and Engineering Fair
STUDENT / PROJECT INFORMATION – PRINT clearly.

Project Title: _____

Student #1 (Team Leader) Information:

OSIS (required for NYC public HS students only): _____

First Name:_____ M.I. _____ Last Name: _____

Address: _____ Apt#: _____

City: _____ State: _____ Zip: _____ Home Phone: (_____) _____

E-mail: _____ Cell Phone: (_____) _____

Date of Birth (mm/dd/yy): ____/____/____ Sex: ___M ___F Current Grade: ___9th ___10th ___11th ___12th

Race/Ethnicity: *(for statistical purposes only - optional)*

Are you Hispanic/Latino? ____Yes ____No

Select one or more races:

___Black or African American ___Asian ___White

___ Native Hawaiian or Pacific Islander ___ American Indian or Alaska Native

School Information

School Name:_____ ETS Code: _____

School Address: _____ City: _____ Zip: _____

Sponsoring Science/Research Teacher: _____ Email: _____

Principal Name: _____ Email: _____

Project Category: (select one) *see page 3 for more descriptions.*

__ Animal Sciences
__ Behavioral & Social Sciences
__ Biochemistry
__ Cellular & Molecular Biology
__ Chemistry
__ Computer Science
__ Engineering
__ Environmental & Earth Sciences
__ Mathematical Science
__ Medicine & Health Sciences
__ Microbiology
__ Physics & Space
__ Plant Sciences

Type of Project? __ *Team __ Individual

**(If team, you must fill out all team members' student information on the Team Information Form)*

If this is a Team Project, are you the **Team Leader**? __ Yes __ No

Will you need **electricity** for your display? __ Yes __ No

2017 New York City Science and Engineering Fair
TEAM INFORMATION

Student # 2 (Team Member) Information:

OSIS (required for NYC public HS students only): _____

First Name:_____ M.I. _____ Last Name: _____

Address: _____ Apt#: _____

City: _____ State: _____ Zip: _____ Home Phone: (_____) _____

E-mail: _____ Cell Phone: (_____) _____

Date of Birth (mm/dd/yy): ____/____/____ Sex: ___M ___F Current Grade: ___9th ___10th ___11th ___12th

Race/Ethnicity: *(for statistical purposes only - optional)*
Are you Hispanic/Latino? ____Yes ____No
Select one or more races:
___Black or African American ___Asian ___White
___ Native Hawaiian or Pacific Islander ___ American Indian or Alaska Native

School Information (*only if different from Team Leader*)

School Name:_____ ETS Code: _____

School Address: _____ City: _____ Zip: _____

Student # 3 (Team Member) Information:

OSIS (required for NYC public HS students only): _____

First Name:_____ M.I. _____ Last Name: _____

Address: _____ Apt#: _____

City: _____ State: _____ Zip: _____ Home Phone: (_____) _____

E-mail: _____ Cell Phone: (_____) _____

Date of Birth (mm/dd/yy): ____/____/____ Sex: ___M ___F Current Grade: ___9th ___10th ___11th ___12th

Race/Ethnicity: *(for statistical purposes only - optional)*
Are you Hispanic/Latino? ____Yes ____No
Select one or more races:
___Black or African American ___Asian ___White
___ Native Hawaiian or Pacific Islander ___ American Indian or Alaska Native

School Information (*only if different from Team Leader*)

School Name:_____ ETS Code: _____

School Address: _____ City: _____ Zip: _____

2017 New York City Science & Engineering Fair
Student Checklist (1A)

This form is required for ALL projects

1) a. Student #1/Team Leader: _____ Grade: _____

   Email: _____ Phone: _____

   b. Student #2/Team Member: _____ c. Student #3/Team Member: _____

2) Title of Project: _____

   _____

3) Adult Sponsor: _____ Phone/Email: _____

4) Indicate the start dates (projected or actual) of the following stages of your project (mm-dd-yyyy):

   a. Background/literature review: _____

   b. Set up or design of experimental conditions and methods, and/or training on equipment: _____

   c. Experimentation/data collection: _____

   d. Data analysis: _____

5) Will you be continuing data collection and analysis between January - May 2017? ☐ Yes ☐ No

6) If you indicated a start date before **01/01/16** on questions 4c or 4d above, this project may be considered a continuation from a previous year. **Please provide the following:**

   a. The previous year's ☐ **Abstract or Project Summary** ☐ **Form 1A*** and ☐ **Research Plan***

   ** If submitted for previous NYCSEF competitions.*

   b. Explain how this project is at a different stage, or is a new research question on ☐ **Continuation Form 7.**

7) Where will you conduct your experimentation? (check all that apply)

   ☐ Research Institution* ☐ School ☐ Field ☐ Home ☐ Other:

   _____

   ** Please submit a Regulated Research Institution Form (1C).*

8) List name and address of NON-SCHOOL work site(s):

   Name:_____ Name: _____

   Address: _____ Address: _____

   _____ _____

   Phone/Email: _____ Phone/Email: _____

2017 New York City Science and Engineering Fair - Application
PROJECT SUMMARY (4 Parts)

The project summary is a succinct detailing of the rationale, research question(s), methodology, and risk assessment of your research project and should be completed after experimental research. This project summary must specifically address Part 1 clearly and concisely in 750 words or less. For most math, computer science, or engineering projects, the 4 sections of the project summary should be used to explain how you came up with and executed your project. Although your project may not fit each section directly, you must use the spaces provided to give detailed accounts regarding your project.

Part 1 of 4: What was the **RATIONALE** for your project? Please include a brief synopsis of the background research that supports your research problem and explain why this research is important scientifically and, if applicable, explain any potential societal impact of your research. Please include citations in your project rationale.

Part 2 of 4: State your HYPOTHESIS(ES) / RESEARCH QUESTION(S) / ENGINEERING GOAL(S) / EXPECTED OUTCOMES. Describe how your research question(s), hypothesis(es) and/or goal(s) build on the research described in your project rationale.

Part 3 of 4: Part A & B

PART A: **Describe in detail your research methods and conclusions.**

- **Procedures/Data Collection:** Detail experimental design, including all procedures used for data collection. Be sure to describe in detail only those methods and procedures you (and your teammates) conducted, and not those of your mentor, teacher, or from any other researcher.
- **Data Analysis:** Describe the procedures to be used to analyze your data and answer your research question(s).
- At a minimum, preliminary data and conclusions MUST be described.

PART B: **Be sure to address all questions in Part B that are relevant to your research project.**

- **HUMAN PARTICIPANTS** (See pages 8-10 of the Rules and Guidelines)
  - **Participants.** Describe who will participate in your study (age range, gender, racial/ethnic composition). Identify any vulnerable populations
  - (minors, pregnant women, prisoners, mentally disabled or economically disadvantaged).
  - **Recruitment.** Where will you find your participants? How will they be invited to participate?
  - **Methods.** What will participants be asked to do? Will you use any surveys, questionnaires or tests? What is the frequency and length of time involved for each participant? Please include a copy of the survey or questionnaire (if used) in the research study and provide information as to how the survey questions will inform the research project.
  - **Risks.** What are the risks or potential discomforts (physical, psychological, time involved, social, legal etc) to participants? How will you minimize the risks?
  - **Benefits.** List any benefits to society or each participant.
  - **Protection of Privacy.** Will any identifiable information (e.g., names, telephone numbers, birthdates, email addresses) be collected? Will data be confidential or anonymous? If anonymous, describe how the data will be collected anonymously. If not anonymous, what procedures are in place for safeguarding confidentiality? Where will the data be stored? Who will have access to the data? What will you do with the data at the end of the study?
  - **Informed Consent Process.** Describe how you will inform participants about the purpose of the study, what they will be asked to do, that their participation is voluntary and they have the right to stop at any time.
- **VERTEBRATE ANIMALS** (See pages 11-13 of the Rules and Guidelines)
  - What POTENTIAL ALTERNATIVES to vertebrate animals were considered for this project? Be sure to present a detailed justification for use of vertebrate animals.
  - What procedures or methods that will be used to minimize potential discomfort, distress, pain and injury to the animals during the course of experimentation and any detailed chemical concentrations and drug dosages. Projects containing procedures classified as USDA Pain Category D or E are PROHIBITED for NYCSEF. Experiments that cause death of a vertebrate animal due to the experimental procedure are PROHIBITED.
  - **Pain Category.** Name the Pain Category associated with your project. Refer to Appendix I on page 5 of the Rules and Guidelines.
  - How many animals will be used in this study? Provide the species, strain, sex, age, etc of the animal and how the animals will be housed and cared for daily. Justify the number of animals planned for this study.
  - How will the animals be disposed of at the termination of the study? Experimental procedures involving toxicity studies, predator/vertebrate prey experiments, or studies where students performed euthanasia on a vertebrate animal are PROHIBITED for NYCSEF.
- **POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS** (See pages 14-17 of the Rules and Guidelines)
  - Provide a description of the Biosafety Level Assessment process and BSL determination (see page 16 for details).
  - Where did you obtain the specimen, agent, source of specific cell line, etc.?
  - What safety precautions will be used during experimentation?
  - How will any potentially hazardous biological agents be disposed of at the end of the study?
- **HAZARDOUS CHEMICALS, ACTIVITIES & DEVICES** (See pages 18-20 of the Rules and Guidelines)
  - Provide a description of the Risk Assessment process and results.
  - Provide a brief summary of the chemical concentrations and drug dosages that will be used in experimentation.
  - What safety precautions and procedures will be used to minimize risk?
  - How will any hazardous chemicals or materials be disposed of at the end of the study?

Part 4 of 4: Provide a list of AT LEAST FIVE (5) MAJOR REFERENCES used to form the basis of your research project. References must be from science journal articles, books, or other publications. Encyclopedias and Internet search engines (e.g. Google, Yahoo, WebMD, Wikipedia, etc.) are not considered as major references and WILL NOT be accepted.

2017 New York City Science and Engineering Fair - Application
PROJECT SUMMARY (Part 1 of 4)

The project summary is a succinct detailing of the rationale, research questions, methodology and risks of your research project and **should be written upon completion of your experimental research**. This project summary must specifically address Part 1 clearly and concisely in 750 words or less.
Part 1 of 4: What is the **RATIONALE** for your project? Please include a brief synopsis of the background research that supports your research problem and explain why this research is important scientifically and, if applicable, explain any potential societal impact of your research. Please include citations in your project rationale.

Title
Student's Name(s)
School Name

Start typing the body of your rationale here beginning at the left margin

2017 New York City Science and Engineering Fair - Application
PROJECT SUMMARY (Part 2 of 4)

The project summary is a succinct detailing of the rationale, research questions, methodology and risks of your research project and **should be written upon completion of your experimental research**. This project summary must specifically address Part 2 clearly and concisely in 250 words or less.
Part 2 of 4: **State your HYPOTHESIS(ES) / RESEARCH QUESTION(S) / ENGINEERING GOAL(S) / EXPECTED OUTCOMES.** Describe how your research question(s), hypothesis(es) and/or goal(s) build on the research described in your project rationale.

Title
Student's Name(s)
School Name

Start typing the body of your hypothesis or goal here beginning at the left margin

2017 New York City Science and Engineering Fair - Application
PROJECT SUMMARY (Part 3 of 4)

The project summary is a succinct detailing of the rationale, research questions, methodology and risks of your research project and **should be written upon completion of your experimental research**. This project summary must specifically address Part 3 clearly and concisely in 500 words or less.

Part 3 of 4: Part A & B

PART A: Describe in detail your research methods and conclusions.

- **Procedures/Data Collection:** Detail experimental design, including all procedures used for data collection. Be sure to describe in detail only those methods and procedures you (and your teammates) conducted, and not those of your mentor, teacher, or from any other researcher. For non-inquiry based research projects describe the process used to arrive at the mathematical solution.
- **Data Analysis:** Describe the procedures to be used to analyze your data and answer your research question(s).
- At a minimum, preliminary data and conclusions must be described.

Be sure to address all questions in Part B that are relevant to your research project.

PART B - For projects with:

- **HUMAN SUBJECTS** (See pages 8-10 of the Rules and Guidelines)
  - **Subjects.** Describe who will participate in your study (age range, gender, racial/ethnic composition). Identify any vulnerable populations (minors, pregnant women, prisoners, mentally disabled or economically disadvantaged).
  - **Recruitment.** Where will you find your subjects? How will they be invited to participate?
  - **Methods.** What will participants be asked to do? Will you use any surveys, questionnaires or tests? What is the frequency and length of time involved for each subject? Please include a copy of the survey or questionnaire (if used) in the research study and provide information as to how the survey questions will inform the research project.
  - **Risks.** What are the risks or potential discomforts (physical, psychological, time involved, social, legal etc) to participants? How will you minimize the risks?
  - **Benefits.** List any benefits to society or each participant.
  - **Protection of Privacy.** Will any identifiable information (e.g., names, telephone numbers, birthdates, email addresses) be collected? Will data be confidential or anonymous? If anonymous, describe how the data will be collected anonymously. If not anonymous, what procedures are in place for safeguarding confidentiality? Where will the data be stored? Who will have access to the data? What will you do with the data at the end of the study?
  - **Informed Consent Process.** Describe how you will inform participants about the purpose of the study, what they will be asked to do, that their participation is voluntary and they have the right to stop at any time.

- **VERTEBRATE ANIMALS** (See pages 11-13 of the Rules and Guidelines)
  - What POTENTIAL ALTERNATIVES to vertebrate animals were considered for this project? Be sure to present a detailed justification for use of vertebrate animals.
  - What procedures or methods that will be used to minimize potential discomfort, distress, pain and injury to the animals during the course of experimentation and any detailed chemical concentrations and drug dosages. Projects containing procedures classified as USDA Pain Category D or E are PROHIBITED for NYCSEF. Experiments that cause death of a vertebrate animal due to the experimental procedure are PROHIBITED.
  - **Pain Category.** Name the Pain Category associated with your project. Refer to Appendix I on page 5 of the Rules and Guidelines.
  - How many animals will be used in this study? Provide the species, strain, sex, age, etc of the animal and how the animals will be housed and cared for daily. Justify the number of animals planned for this study.
  - How will the animals be disposed of at the termination of the study? Experimental procedures involving toxicity studies, predator/vertebrate prey experiments, or studies where students performed euthanasia on a vertebrate animal are PROHIBITED for NYCSEF.

- **POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS** (See pages 14-17 of the Rules and Guidelines)
  - Provide a description of the Biosafety Level Assessment process and BSL determination (see page 17 for details).
  - Where did you obtain the specimen, agent, source of specific cell line, etc.?
  - What safety precautions will be used during experimentation?
  - How will any potentially hazardous biological agents be disposed of at the end of the study?

- **HAZARDOUS CHEMICALS, ACTIVITIES & DEVICES** (See pages 18-20 of the Rules and Guidelines)
  - Provide a description of the Risk Assessment process and results.
  - Provide a brief summary of the chemical concentrations and drug dosages that will be used in experimentation.
  - What safety precautions and procedures will be used to minimize risk?
  - How will any hazardous chemicals or materials be disposed of at the end of the study?

2017 New York City Science and Engineering Fair - Application
PROJECT SUMMARY (Part 3 of 4)

The project summary is a succinct detailing of the rationale, research questions, methodology and risks of your research project and **should be written upon completion of your experimental research**.

Part 3 of 4: State your **RESEARCH METHODS/ANALYSIS** and address **PART B QUESTIONS below**.

Title Student's Name(s) School Name
Start typing your research methods, analysis, and Part B here beginning at the left margin

2017 New York City Science and Engineering Fair - Application
PROJECT SUMMARY (Part 4 of 4)

The project summary is a succinct detailing of the rationale, research questions, methodology and risks of your research project and **should be written upon completion of your experimental research**. This project summary must specifically address Part 4 clearly and concisely in 250 words or less.

Part 4 of 4: **Provide a list of AT LEAST FIVE (5) MAJOR REFERENCES** used to form the basis of your research project. References must be from science journal articles, books, or other publications. Encyclopedias and Internet search engines (e.g. Google, Yahoo, WebMD, Wikipedia, etc.) are not considered as major references and WILL NOT be accepted.

Title
Student's Name(s)
School Name

Start typing your list of major references here beginning at the left margin

2017 New York City Science and Engineering Fair - Application
Official Project Abstract

After finishing research and experimentation, you are required to write a (maximum) 500 word, one-page abstract. Your abstract should include the following**: a) purpose of the experiment, b) procedure, c) data, and d) conclusions**. It may also include any possible research applications. Only minimal reference to previous work may be included. An abstract must NOT include the following: a) acknowledgments (including naming the research institution and/or mentor with which you were working), or self-promotions and external endorsements b) work or procedures done by the mentor.

Title
Student's Name(s)

School Name

Start typing the body of your abstract here beginning at the left margin.

1. Student(s) independently performed all procedures as outlined in the abstract. ☐ Yes ☐ No
2. Student(s) worked or used equipment in a site other than school, field, or home. ☐ Yes ☐ No
3. This project is a continuation of previous research. ☐ Yes ☐ No

I/We hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I/We also attest that the above properly reflects my/our own work.

Finalist or Team Leader Signature Date

Approval Form (1B)

A completed form is required for each student, including all team members.

1. To Be Completed by Student and Parent

a. Student Acknowledgment:

- I understand the risks and possible dangers to me of the proposed research plan.
- I have read the Intel ISEF Rules and Guidelines and will adhere to all International Rules when conducting this research.
- I have read and will abide by the following Ethics statement

Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include but are not limited to plagiarism, forgery, use or presentation of other researcher's work as one's own, and fabrication of data. Fraudulent projects will fail to qualify for competition in affiliated fairs and the Intel ISEF.

Student's Printed Name	Signature	Date Acknowledged (mm/dd/yy) (Must be prior to experimentation.)

b. Parent/Guardian Approval: I have read and understand the risks and possible dangers involved in the **Research Plan/Project Summary**. I consent to my child participating in this research.

Parent/Guardian's Printed Name	Signature	Date Acknowledged (mm/dd/yy) (Must be prior to experimentation.)

2. To be completed by the local or affiliated Fair SRC

(Required for projects requiring prior SRC/IRB APPROVAL. Sign 2a or 2b as appropriate.)

a. Required for projects that need prior SRC/IRB approval BEFORE experimentation (humans, vertebrates or potentially hazardous biological agents).

The SRC/IRB has carefully studied this project's **Research Plan/Project Summary** and all the required forms are included. My signature indicates approval of the **Research Plan/Project Summary** before the student begins experimentation.

SRC/IRB Chair's Printed Name

Signature | Date of Approval (mm/dd/yy) (Must be prior to experimentation.)

OR

b. Required for research conducted at all Regulated Research Institutions with no prior fair SRC/IRB approval.

This project was conducted at a regulated research institution (**not home or high school, etc.**), was reviewed and approved by the proper institutional board before experimentation and complies with the Intel ISEF Rules. **Attach (1C) and any required institutional approvals (e.g. IACUC, IRB).**

SRC Chair's Printed Name

Signature | Date of Approval (mm/dd/yy)

3. Final Intel ISEF Affiliated Fair SRC Approval (Required for ALL Projects)

SRC Approval After Experimentation and Before Competition at Regional/State/National Fair

I certify that this project adheres to the approved **Research Plan/Project Summary** and complies with all Intel ISEF Rules.

Regional SRC Chair's Printed Name	Signature	Date of Approval
State/National SRC Chair's Printed Name *(where applicable)*	Signature	Date of Approval

Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:

(Responses must remain on the form as it is required to be displayed at student's project booth.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher? ☐ Yes ☐ No
   a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

   b. If yes, complete questions 2–5.

2. Is the student's research project a subset of your ongoing research or work? ☐ Yes ☐ No
   Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site.

3. Describe the independence and creativity with which the student:
   a. developed the hypotheses or engineering goals for her/her research project

   b. designed the methodology for his/her research project

   c. analyzed and interpreted data

4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

5. Did the student(s) work on the project as part of a group? ☐ Yes ☐ No
   If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.
I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Supervising Adult's Printed Name	Signature	Title
Institution		Date Signed (must be after experimentation)
Address		Email/Phone

Qualified Scientist Form (2)

May be required for research involving human participants, vertebrate animals, potentially hazardous biological agents, and DEA-controlled substances. Must be completed and signed before the start of student experimentation.

Student's Name(s) _____

Title of Project _____

To be completed by the Qualified Scientist:

Scientist Name: _____

Educational Background: _____ Degree(s): _____

Experience/Training as relates to the student's area of research:

_____ _____

Position: Institution:

_____ _____

Address: Email/Phone:

1) Have you reviewed the Intel ISEF rules relevant to this project? ☐ Yes ☐ No

2. Will any of the following be used?
   a. Human participants ☐ Yes ☐ No
   b. Vertebrate animals ☐ Yes ☐ No
   c. Potentially hazardous biological agents (microorganisms, rDNA and tissues, including blood and blood products) ☐ Yes ☐ No
   d. DEA-controlled substances ☐ Yes ☐ No

3. Was this study a sub-set of a larger study? ☐ Yes ☐ No

4. Will you directly supervise the student? ☐ Yes ☐ No
   a. If no, who will directly supervise and serve as the Designated Supervisor? _____
   b. Experience/Training of the Designated Supervisor:

To be completed by the Qualified Scientist:

I certify that I have reviewed and approved the Research Plan/Project Summary prior to the start of the experimentation. If the student or Designated Supervisor is not trained in the necessary procedures, I will ensure her/his training. I will provide advice and supervision during the research. I have a working knowledge of the techniques to be used by the student in the Research Plan/Project Summary. I understand that a Designated Supervisor is required when the student is not conducting experimentation under my direct supervision.

_____

Qualified Scientist's Printed Name

_____ _____

Signature Date of Approval

To be completed by the Designated Supervisor when the Qualified Scientist cannot directly supervise.

I certify that I have reviewed the Research Plan/Project Summary and have been trained in the techniques to be used by this student, and I will provide direct supervision.

_____

Designated Supervisor's Printed Name

_____ _____

Signature Date of Approval

_____ _____

Phone Email

Risk Assessment Form (3)

Required for projects using hazardous chemicals, activities or devices and microorganisms which are exempt from pre-approval. Must be completed before experimentation.

Student's Name(s) _____

Title of Project _____

_____

To be completed by the Student Researcher(s) in collaboration with Designated Supervisor/Qualified Scientist: (All questions must be answered; additional page(s) may be attached.)

1. List all hazardous chemicals, activities, or devices that will be used; identify microorganisms exempt from pre-approval (see Potentially Hazardous Biological Agent rules).

2. Identify and assess the risks involved in this project.

3. Describe the safety precautions and procedures that will be used to reduce the risks.

4. Describe the disposal procedures that will be used (when applicable).

5. List the source(s) of safety information.

To be completed and signed by the Designated Supervisor (or Qualified Scientist, when applicable):
I agree with the risk assessment and safety precautions and procedures described above. I certify that I have reviewed the Research Plan/Project Summary and will provide direct supervision.

_____ _____ _____

Designated Supervisor's Printed Name | Signature | Date of Review (mm/dd/yy)

_____ _____

Position & Institution | Phone or email contact information

_____

Experience/Training as relates to the student's area of research

Human Participants Form (4)

Required for all research involving human participants not at a Regulated Research Institution. If at a Regulated Research Institution, use institutional approval forms for documentation of prior review and approval.
(IRB approval required before experimentation.)

Student's Name(s) | Title of Project

Adult Sponsor | Phone/Email

Must be completed by Student Researcher(s) in collaboration with the Adult Sponsor/Designated Supervisor/Qualified Scientist:

1. ☐ I have submitted my Research Plan/Project Summary which addresses ALL areas indicated in the Human Participants Section of the Research Plan/Project Summary Instructions.
2. ☐ I have attached any surveys or questionnaires I will be using in my project or other documents provided to human participants.
   ☐ Any published instrument(s) used was /were legally obtained.
3. ☐ I have attached an informed consent that I would use if required by the IRB.
4. ☐ Yes ☐ No Are you working with a Qualified Scientist? If yes, attach the Qualified Scientist Form 2.

BELOW - IRB USE ONLY

Must be completed by Institutional Review Board (IRB) after review of the research plan. All questions must be answered for the approval to be valid. (If not approved, return paperwork to the student with instructions for modifications.)

☐ Approved with Full Committee Review (3 signatures required) and the following conditions: (All 6 must be answered)

1. Risk Level (check one) : ☐ Minimal Risk ☐ More than Minimal Risk
2. Qualified Scientist (QS) Required: ☐ Yes ☐ No
3. Designated Supervisor (DS) Required: ☐ Yes ☐ No
4. Written Minor Assent required for minor participants:
   ☐ Yes ☐ No ☐ Not applicable (No minors in this study)
5. Written Parental Permission required for minor participants:
   ☐ Yes ☐ No ☐ Not applicable (No minors in this study)
6. Written Informed Consent required for participants 18 years or older:
   ☐ Yes ☐ No ☐ Not applicable (No participants 18 yrs or older in this study)

☐ Approved with Expedited Review (1 signature required). Study involves either of the following:

☐ Human participants will only provide feedback on project design/student-designed invention or prototype. etc., no personal data will be collected and there are no health or safety hazards.

☐ Student is the only subject of the research and no more than minimal risk is involved.

IRB SIGNATURES (All 3 signatures required unless expedited review checked above) None of these individuals may be the adult sponsor, designated supervisor, qualified scientist or related to (e.g., mother, father of) the student (conflict of interest).

I attest that I have reviewed the student's project, that the checkboxes above have been completed to indicate the IRB determination and that I agree with the decisions above.

Medical or Mental Health Professional (a psychologist, medical doctor, licensed social worker, licensed clinical professional counselor, physician's assistant, or registered nurse) with expertise related to this project.

Printed Name | Degree/Professional License

Signature | Date of Approval (Must be prior to experimentation.)

Educator

Printed Name | Degree

Signature | Date of Approval (Must be prior to experimentation.)

School Administrator

Printed Name | Degree/Professional License

Signature | Date of Approval (Must be prior to experimentation.)

Human Informed Consent Form

Instructions to the Student Researcher(s): An informed consent/assent/permission form should be developed in consultation with the Adult Sponsor, Designated Supervisor or Qualified Scientist.
This form is used to provide information to the research participant (or parent/guardian) and to document written informed consent, minor assent, and/or parental permission.

- When written documentation is required, the researcher keeps the original, signed form.
- Students may use this sample form or may copy ALL elements of it into a new document.

If the form is serving to document parental permission, a copy of any survey or questionnaire must be attached.

Student Researcher(s): _____

Title of Project: _____

I am asking for your voluntary participation in my science fair project. Please read the following information about the project. If you would like to participate, please sign in the appropriate area below.

Purpose of the project:

If you participate, you will be asked to:

Time required for participation:

Potential Risks of Study:

Benefits:

How confidentiality will be maintained:

If you have any questions about this study, feel free to contact:

Adult Sponsor/QS/DS: _____ Phone/email: _____

Voluntary Participation:

Participation in this study is completely voluntary. If you decide not to participate there will not be any negative consequences. Please be aware that if you decide to participate, you may stop participating at any time and you may decide not to answer any specific question.

By signing this form I am attesting that I have read and understand the information above and I freely give my consent/assent to participate or permission for my child to participate.

Adult Informed Consent or Minor Assent Date Reviewed & Signed: _____

_____ _____

Research Participant Printed Name: Signature:

Parental/Guardian Permission (if applicable) Date Reviewed & Signed: _____

_____ _____

Parent/Guardian Printed Name: Signature:

Vertebrate Animal Form (5A)

Required for all research involving vertebrate animals that is conducted in a school/home/field research site. (SRC approval required before experimentation.)

Student's Name(s) _____

Title of Project _____

_____

To be completed by Student Researcher:

1. Common name (or Genus, species) and number of animals used.

2. Describe completely the housing and husbandry to be provided. Include the cage/pen size, number of animals per cage, environment, bedding, type of food, frequency of food and water, how often animal is observed, etc. Add an additional page as necessary.

3. What will happen to the animals after experimentation?

4. Attach a copy of wildlife licenses or approval forms, as applicable

5. The Intel ISEF Vertebrate Animal Rules require that any death, illness or unexpected weight loss be investigated and documented by a letter from the qualified scientist, designated supervisor or a veterinarian. If applicable, attach this letter with this form when submitting your paperwork to the SRC prior to competition.

To be completed by Local or Affiliate Fair Scientific Review Committee (SRC) BEFORE experimentation.

Level of Supervision Required for agricultural, behavioral or nutritional studies:

- ☐ Designated Supervisor REQUIRED. Please have applicable person sign below.
- ☐ Veterinarian and Designated Supervisor REQUIRED. Please have applicable persons sign below.
- ☐ Veterinarian, Designated Supervisor and Qualified Scientist REQUIRED. Please have applicable persons sign below and have the Qualified Scientist complete Form (2).

The SRC has carefully reviewed this study and finds it is an appropriate study that may be conducted in a non-regulated research site.
Local or Affiliate Fair SRC Pre-Approval Signature:

SRC Chair Printed Name	Signature	Date of Approval (must be prior to experimentation) (mm/dd/yy)

To be completed by Veterinarian:

- ☐ I have reviewed this research and animal husbandry with the student before the start of experimentation.
- ☐ I have approved the use and dosages of prescription drugs and/or nutritional supplements.
- ☐ I will provide veterinary medical and nursing care in case of illness or emergency.

Printed Name	Email/Phone
Signature	Date of Approval

To be completed by Designated Supervisor or Qualified Scientist when applicable:

- ☐ I have reviewed this research and animal husbandry with the student before the start of experimentation and I accept primary responsibility for the care and handling of the animals in this project.
- ☐ I will directly supervise the experiment.

Printed Name	Email/Phone
Signature	Date of Approval

Vertebrate Animal Form (5B)

Required for all research involving vertebrate animals that is conducted in at a Regulated Research Institution. (IACUC approval required before experimentation. Form must be completed and signed after experimentation.)

Student's Name(s) _____

Title of Project _____

Title and Protocol Number of IACUC Approved Project _____

_____

To be completed by Qualified Scientist or Principal Investigator:

1. Species of animals used: _____ Number of animals used: _____

2. Describe, in detail, the role of the student in this project: animal procedures and related equipment that were involved, oversight provided and safety precautions employed. (Attach extra pages if necessary.)

3. Was there any weight loss or death of any animal? If yes, attach a letter obtained from the qualified scientist, designated supervisor or a veterinarian documenting the situation and the results of the investigation.

4. Did the student's project also involve the use of tissues?
   - ☐ No
   - ☐ Yes; complete Forms 6A and 6B

5. What laboratory training, including dates, was provided to the student?

6. **Attach a copy of the Regulated Research Institution IACUC Approval.** A letter from the Qualified Scientist or Principal Investigator is not sufficient**.**

Qualified Scientist/Principal Investigator	
Printed Name	
Signature	Date

Potentially Hazardous Biological Agents Risk Assessment Form (6A)

Required for research involving microorganisms, rDNA, fresh/frozen tissue (including primary cell lines, human and other primate established cell lines and tissue cultures), blood, blood products and body fluids.
SRC/IACUC/IBC approval required before experimentation.

Student's Name(s) _____

Title of Project _____

To be completed by the QUALIFIED SCIENTIST/DESIGNATED SUPERVISOR in collaboration with the student researcher(s). All questions are applicable and must be answered; additional page(s) may be attached.

SECTION 1: PROJECT ASSESSMENT

1. Identify potentially hazardous biological agents to be used in this experiment. Include the source, quantity and the biosafety level risk group of each microorganism.

2. Describe the site of experimentation including the level of biological containment.

3. Describe the procedures that will be used to minimize risk (personal protective equipment, hood type, etc.).

4. What final biosafety level do you recommend for this project given the risk assessment you conducted?

5. Describe the method of disposal of all cultured materials and other potentially hazardous biological agents.

SECTION 2: TRAINING

1. What training will the student receive for this project?

2. Experience/training of Designated Supervisor as it relates to the student's area of research (if applicable).

SECTION 3: For ALL CELL LINES and MICROORGANISMS – To be completed by the QUALIFIED SCIENTIST or DESIGNATED SUPERVISOR - Check the appropriate box(es) below:

- ☐ Experimentation on the cell line/microorganism used in this study was not conducted at a Regulated Research Institution, but was conducted at a (check one) ___BSL-1 or ___BSL-2 laboratory. This study has been reviewed by the local SRC and the procedures have been approved prior to experimentation.

- ☐ Experimentation on the cell line/microorganism used in this study was conducted at a Regulated Research Institution and was approved by the appropriate institutional board prior to experimentation; institutional approval forms are attached.
  Origin of cell lines:_____ Date of IACUC/IBC approval (mm/dd/yy) _____

- ☐ Experimentation on the cell line/microorganism used in this study was conducted at a Regulated Research Institution, which does not require pre-approval for this type of study. The SRC has reviewed that the student received appropriate training and the project complies with Intel ISEF rules.

CERTIFICATION – To be SIGNED by the QUALIFIED SCIENTIST or DESIGNATED SUPERVISOR

The QS/DS has seen this project's research plan and supporting documentation and acknowledges the accuracy of the information provided above. This study has been approved as a (check one) ☐ BSL-1/ ☐ BSL-2 study, and will be conducted in an appropriate laboratory.

_____ _____
QS/DS Printed Name Signature

SECTION 4: CERTIFICATION – To be completed by the LOCAL or AFFILIATED FAIR SRC

The SRC has seen this project's research plan and supporting documentation and acknowledges the accuracy of the information provided above.

_____ _____
SRC Printed Name Signature

Human and Vertebrate Animal Tissue Form (6B)

Required for research involving fresh/frozen tissue (including primary cell lines, human and other primate established cell lines and tissue cultures), blood, blood products and body fluids. If the research involves living organisms please ensure that the proper human or animal forms are completed. **All projects using any tissue listed above must also complete Form 6A.**

Student's Name(s)_____

Title of Project _____

To be completed by Student Researcher(s):

1. What vertebrate animal tissue will be used in this study? Check all that apply.
   - ☐ Fresh or frozen tissue sample
   - ☐ Fresh organ or other body part
   - ☐ Blood
   - ☐ Body fluids
   - ☐ Primary cell/tissue cultures
   - ☐ Human or other primate established cell lines

2. Where will the above tissue(s) be obtained. If using an established cell line include source and catalog number.

3. If the tissue will be obtained from a vertebrate animal study conducted at a research institution attach a copy of the IACUC certification with the name of the research institution, the title of the study, the IACUC approval number and date of IACUC approval.

To be completed by the Qualified Scientist or Designated Supervisor:

☐ I verify that the student will work solely with organs, tissues, cultures or cells that will be supplied to him/her by myself or qualified personnel from the laboratory; and that if vertebrate animals were euthanized they were euthanized for a purpose other than the student's research.

AND/OR

☐ I certify that the blood, blood products, tissues or body fluids in this project will be handled in accordance with the standards and guidance set forth in Occupational Safety and Health Act, 29CFR, Subpart Z, 1910.1030 - Blood Borne Pathogens.

Printed Name	Signature	Date of Approval (Must be prior to experimentation.)

Title	Phone/Email

Institution

Continuation/Research Progression Projects Form (7)

Required for projects that are a continuation/progression in the same field of study as a previous project.
This form must be accompanied by the previous year's abstract and Research Plan/Project Summary.

Student's Name(s)_____

To be completed by Student Researcher:

List all components of the current project that make it new and different from previous research. The information must be on the form; use an additional form for 2013–2014 and earlier projects.

Components	Current Research Project	Previous Research Project
1. Title		2015–2016 2014–2015
2. Change in goal/purpose/ objective		2015–2016 2014–2015
3. Changes in methodology		2015–2016 2014–2015
4. Variables studied		2015–2016 2014–2015
5. Additional changes		2015–2016 2014–2015

Attached are:

☐ 2015–2016 Abstract and Research Plan/Project Summary ☐ 2014–2015 Abstract

I hereby certify that the above information is correct and that the current year Abstract & Certification and project display board properly reflect work done only in the current year.

Student's Printed Name(s) Signature Date of Signature