



Republic of the Philippines
Department of Education

26 OCT 2017

DepEd MEMORANDUM
No. **175**, s. 2016

NATIONAL SCIENCE AND TECHNOLOGY FAIR FOR SCHOOL YEAR 2017-2018

To: Undersecretaries
Assistant Secretaries
Bureau and Service Directors
Regional Directors
Schools Division Superintendents
Public and Private Secondary Schools Heads
All Others Concerned

1. The Department of Education (DepEd), through the Bureau of Curriculum Development (BCD), announces the conduct of the **National Science and Technology Fair (NSTF) for School Year 2017-2018** from February 5 to 9, 2018 at the Tagaytay International Convention Center, Tagaytay City. The conduct of the school, schools division, and regional Science and Technology Fair (STF) shall be held on the following dates:

Level	Date
School	September 2017
Schools Division	October 2017
Regional	November 2017

2. The STF aims to promote Science and Technology consciousness among the youth and identify the most creative/innovative and the best Science researchers who will represent the country in the Intel International Science and Engineering Fair (Intel ISEF) and other international competitions. Junior and Senior High Schools are enjoined to conduct schoolwide STF for the selection of the best researchers who will represent the school in higher level competitions.

3. The official participants from each region at the national level DepEd-BCD STF shall only be the **Rank 1 Regional Winners** in each of the different categories, whose entries have been approved by the national level Scientific Review Committee (SRC). If all projects are approved by the national level SRC, there shall be a maximum number of 17 official delegates per region. *Substitutes shall not be allowed.* The description and maximum number of official participants are the following:

Description of Official Participants per Region	Maximum Number of Participants
Life Science Category	4
Physical Science Category	4
Robotics and Intelligent Machines Category	4
Adult-in-Charge	3
Regional Supervisor	2
Total	17

4. Travel expenses of participants in the national level STF shall be charged to local funds or other sources, whereas, the expenses of the BCD staff, board and lodging of official participants, materials, transportation and communication relative to these activities, prizes and cash awards, and honoraria of members of the SRC, Board of Judges (BOJ), and external or non-DepEd resource persons shall be charged to the BCD Funds, subject to the usual accounting and auditing rules and regulations. However, observers who would like to be included as part of the official party must be endorsed by the DepEd regional office and shall shoulder their traveling expenses and registration fee.

5. The following documents are enclosed for information and guidance of all concerned:

- Enclosure No. 1 – Guidelines on the National STF 2017-2018;
- Enclosure No. 2 – Schematic Diagram on the Flow of STF Activities;
- Enclosure No. 3 – 2017-2018 Calendar of Important STF Activities and Requirements;
- Enclosure No. 4 – Format of Research Paper;
- Enclosure No. 5 – Format of the Data and Report;
- Enclosure No. 6 – Checkpoints for SRC Review;
- Enclosure No. 7 – SRC Review and Recommendation Report; and
- Enclosure No. 8 – BOJ Project Evaluation Form.

6. Further, regional coordinators (RCs), Division Science and Math supervisors, school heads, and participants are expected to download softcopies of the International Rules for Pre-college Science Research: Guidelines for Science and Engineering Fair 2017-2018 and required forms from <https://student.societyforscience.org/intel-isef-forms>.

7. The registration fee for each participant is as follows:

Level	Participant	Registration Fee
Schools Division	<ul style="list-style-type: none"> • Students with entries • Research advisers • Supervisors in Science and Mathematics 	P2,500.00
Regional	<ul style="list-style-type: none"> • Students with entries • Research advisers • Supervisors in Science and Mathematics 	P5,000.00
National	<ul style="list-style-type: none"> • Observers endorsed by the region 	P7,000.00 4-day board and lodging + kit

8. The registration fee shall be charged to local funds, subject to the usual accounting and auditing rules and regulations. This fee will cover prizes, board and lodging of the participants and their advisers, Science and Mathematics supervisors, and the materials needed to the conduct of the STF. The subsidy to cover the payment for honoraria of the members of the SRC and BOJ relative to the conduct of the Regional STF shall be downloaded to the regions.

9. The RCs are requested to submit to BCD, through nstf@deped.gov.ph, the reports using the format provided in Enclosure No. 5 on or before **December 8, 2017**. Failure to submit the report on time shall disqualify the region in the national fair.

10. All other activities relative to Science, Technology, Engineering and Mathematics research projects, including those of the private associations, shall be harmonized with the activities of the NSTF from **February 5 to 9, 2018**. Furthermore, it is also strongly encouraged that the school level STF be participated by all students even those coming from other special interests programs.

11. For more information, all concerned may contact **Ms. Anna Liza M. Chan**, Senior Education Program Specialist, Bureau of Curriculum Development–Curriculum Standards Development Division (BCD–CSDD), Department of Education (DepEd) Central Office, 3/F Bonifacio Building, DepEd Complex, Meralco Avenue, Pasig City at telephone nos. (02) 632-7746 and (02) 635-9822 or through email address: nstf@deped.gov.ph.

12. Immediate dissemination of this Memorandum is desired.


LEONOR MAGTOLIS BRIONES
Secretary

Encls.:

As stated

Reference:

DepEd Memorandum No. 176, s. 2016

To be indicated in the Perpetual Index
under the following subjects:

CELEBRATIONS AND FESTIVALS
CONTESTS
LEARNING AREA, MATHEMATICS
SCHOOLS
SCIENCE EDUCATION
STUDENTS

GUIDELINES ON THE NATIONAL SCIENCE AND TECHNOLOGY FAIR 2017-2018

Similar to the previous national level fair, the National Science and Technology Fair (STF) for 2017-2018 is an Intel ISEF-affiliated fair. As such, the requirements for affiliated fairs should be met and followed as stated in the ISEF guidelines mentioned on page 2 of this Memorandum.

1. The Science Fair

The Bureau of Curriculum Development of the Department of Education (DepEd-BCD) shall conduct the **National STF 2017-2018** on **February 5-9, 2018**.

The STF is a nationwide science research competition that aims to promote Science and Technology consciousness among the youth. It also aims to identify the most creative and the best Science student researchers who will represent the country in the Intel International Science and Engineering Fair 2018 (Intel ISEF 2018) and other international/regional science and technology fairs.

2. The Research Competitions

The competitions will be conducted among Junior and Senior High School students from both public and private schools. The first place winners in each of the categories at the Regional level shall represent the region to the National STF competition as approved by the national Scientific Review Committee (SRC).

The competition will start at the school level advancing to the division, regional, national then to the international level. Regional Science High Schools (RSHSs) are **expected** to join the regional fair directly. RSHSs may submit only one entry per category or a maximum of six (6) projects in the regional fair.

The participation of schools in the NSTF shall be clustered into three types: life science, physical science, and robotics and intelligent machines. All mathematics- and engineering-related projects shall join in the Physical Science Category.

Life Science (LS)		Physical Science (PS)		Robotics and Intelligent Machines (RIM)	
Individual Project	Team Project	Individual Project	Team Project	Individual Project	Team Project

3. Levels of Research Competition

School/Division Level

The conduct of the school/division level shall be done on a weekend to conform with DepEd Order No. 26, s. 2010 (Calendar of School Events and Activities For SY 2010-2011). The school and division level STF should refer to Enclosure No. 3 for the schedules of the competition.

The following are the forms and manuscripts to be submitted in all levels of the competition:

1. RESEARCH PLAN
2. FORMS for all the projects
 - A. Checklist for Adult Sponsor
 - B. Student Checklist (1A)
 - C. Research Plan (NOTE: No need to attach the Research Plan Instructions)

- D. Approval Form (1B)
 - E. Regulated Research Institutional/Industrial Setting Form (1C)
3. FORMS depending on the type of research (e.g involving humans, vertebrate animals, hazardous chemicals, etc.)
- A. Qualified Scientist Form (2)
 - B. Risk Assessment Form (3)
 - C. Human Participants Form (4)
 - D. Human Informed Consent Form
 - E. Vertebrate Animal Form (5A)
 - F. Vertebrate Animal Form (5B)
 - G. Potentially Hazardous Biological Agents Risk Assessment Form (6A)
 - H. Human and Vertebrate Animal Tissue Form (6B)
 - I. Continuation Project Form (7)
4. Abstract (Maximum of 250 words)
The abstract should include the following:
- A. Purpose of the experiment
 - B. Procedure
 - C. Data conclusion
- The abstract may NOT include the following:
- A. Acknowledgement
 - B. Work of procedures done by the mentor
5. Research Paper (Include the Title Page, Abstract, Main Body, and References)
6. Project Evaluation Form (see Enclosure No.8)
7. Scanned copy of the log book

Project of proponents should have been screened by the Institutional Review Board (IRB)/Scientific Review Committee (SRC) at the school-level. All school level winners must be certified by the division SRC to join in the division-level fair.

The Division Science/Mathematics Supervisor shall be a member of the BOJ who shall determine the school/division winners of the different categories and fair divisions.

With the exception of RSHSs and PSHSs, students of both regular and science high schools of private and public high schools shall participate in the division-level STF.

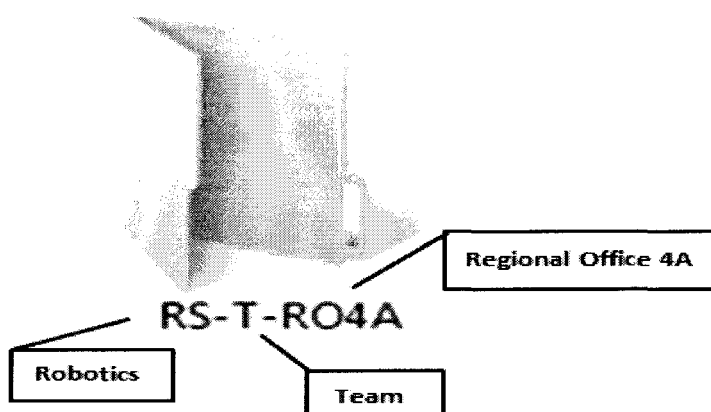
Winners at the school level should be officially endorsed to the division office for the division-level. Likewise, the division-level winners should be officially endorsed to the regional office.

Regional Level

The first place winners at the division level in both clusters shall be properly scrutinized by identified members of the SRC for the regional level competition.

The official list of the **first place winners at the regional level**, report on the conduct of STF, soft copies of the manuscripts and other necessary documents shall be officially **endorsed by the Regional Office to DepEd Central Office through the BCD**. The soft copies must be saved in the CD containing six (6) folders representing the six (6) categories. Each folder must contain the manuscripts in Pdf format and another folder containing all the required forms including the scanned copies of the research logbook.

Example:



Folder Code	Content of the Folder	Sample Content of the folder for Forms
LS-I-RO1 *life science-individual-region 1	Manuscript: LS-I-RO1-School Name	-
	Folder containing the needed forms: LS-I-RO1-Forms *name of the folder where all the soft copies of the necessary forms are found	LS-I-RO1-Form1
		LS-I-RO1-Form 2
		LS-I-RO1-Logbook

The Report of the Conduct of the STF shall include the following:

1. Title
2. Table of Contents
3. Introduction/Rationale
4. Detailed Information
 - General information
 - SRC Deliberation (include the results , findings and recommendations)
 - Program of Activities (day-to-day activities)
 - List of Entries (include the brief profile of the research adviser of each entry)
 - List of Winners
 - Trend Analysis (results from 3 consecutive years)

- Financial Report
- 5. Conclusions
- 6. Recommendations
- 7. Appendix

National Level

The First Place winners of the six (6) categories shall represent the region to the national-level STF to be conducted on February 13-17, 2017 at a venue to be announced later.

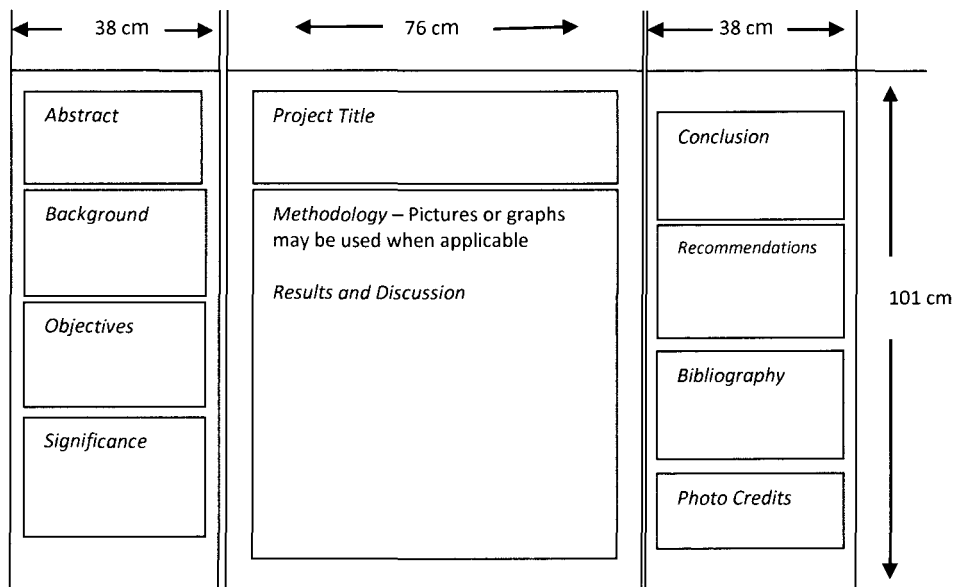
4. The Research Project

Science research projects must conform with international rules published by the **Intel International Rules for Pre-college Science Research: Guidelines for Science and Engineering Fair 2018**. Each project is expected to have a Research Adviser and an Institutional Review Board (IRB) or a Scientific Review Committee (SRC).

The research project should cover a maximum of twelve (12) continuous months from January 2017 to December 2017.

Ethics Statement. Scientific fraud and misconduct is not condoned at any level of research or competition. Plagiarism, use or presentation of other research's work as one's own and fabrication of data will not be tolerated. Fraudulent projects are disqualified from the competition.

5. The Exhibit



5.1 Display and Safety Regulations

The project display using **sets of any paper or board** summarizes the research project and must focus on the proponent's work for this year's study, and if applicable, with only minimal reference to previous research. **Tarpaulins will not** be used in the NSTF in support of the environmental advocacy of the government in reducing the consumption of non-biodegradable or non-recyclable materials.

The safety regulations that must be adhered to should be consistent with the guidelines found on page 24 of the ISEF guidelines (<https://sspcdn.blob.core.windows.net/files/Documents/SEP/ISEF/2018/Rules/Book.pdf>).

The following items should be seen in the project display: Abstract, Background, Objectives, Significance, Methodology, Results and Discussion, Conclusion, Recommendations, Bibliography and if applicable, Photo Credits (including illustrations and graphics).

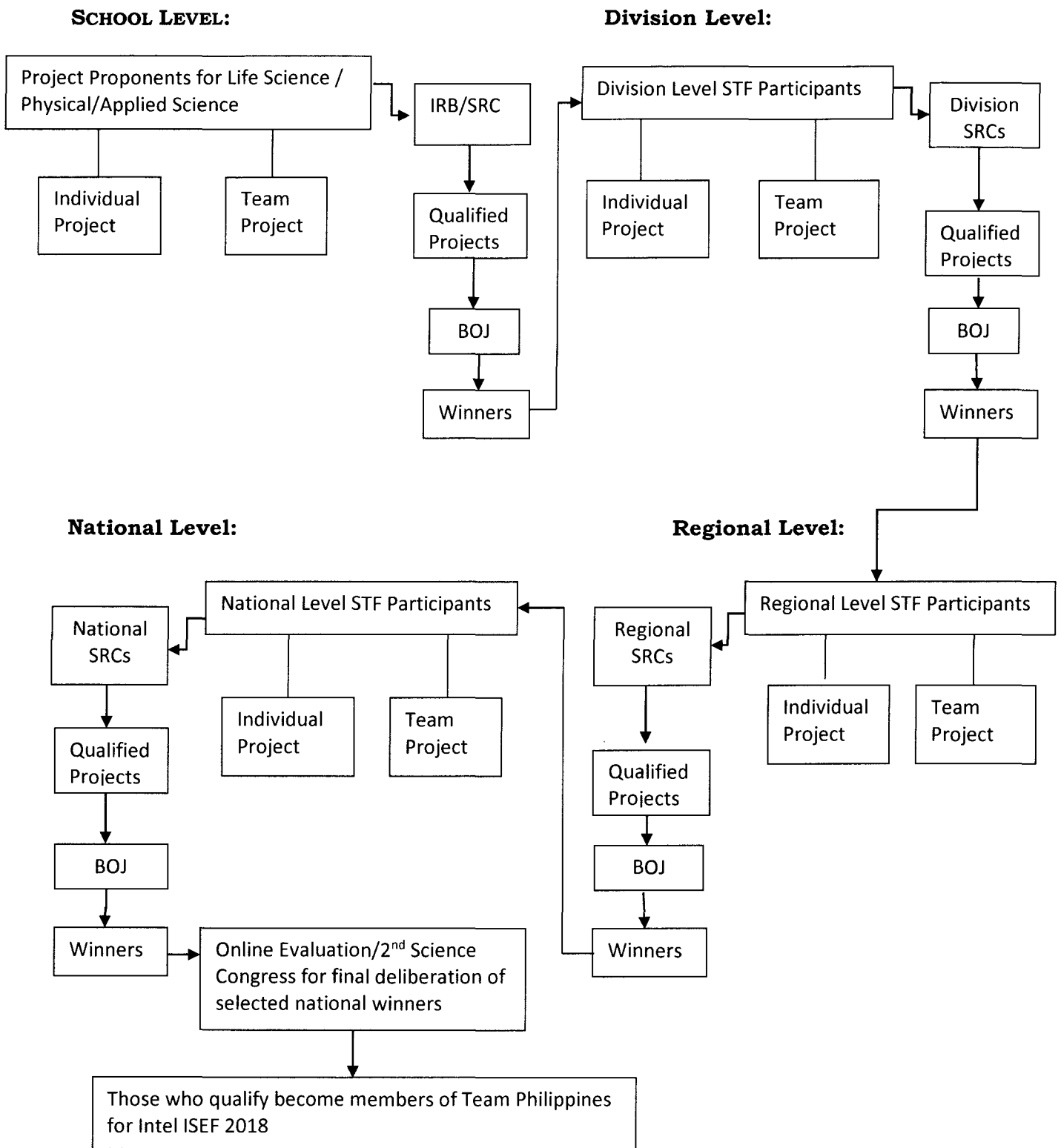
*Note that a proponent should **not** include his/her face in the project's procedure/illustration in the display.*

5.2 Requirements for presentation by the Project Proponent/s to the BOJ during the exhibit are the following:

- Copy of the required forms
- Copy of the research write-up
- Project data book or student journal complete with dates of entry, number of pages, and all other details (Refer also at ISEF Student Handbook website: <https://student.societyforscience.org/international-rules-pre-college-science-research>).

- 6.** In addition to the usual research competition, the **NSTF Educator Academy** shall be held to cater to the official adult participants of NSTF which may include research advisers, adult-in-charge, science supervisors and school heads. This gives the participants opportunity for learning and development through the attendance in various shop talks designed to promote innovation, creativity and excellence in science and research education. The topics are selected to assist educators in managing science programs in their respective areas such as schools, division, districts and regions. The event also gives research advisers and experts an opportunity to share their best practices that benefit the adviser and supervisors in assisting student science research initiatives. Pre-registration to this activity is required.

SCHEMATIC DIAGRAM OF THE FLOW OF STF ACTIVITIES



CALENDAR OF IMPORTANT STF ACTIVITIES AND REQUIREMENTS

Activity	Date	Required Items	Persons Involved	Venue
Submission to BCD of the Regional entries <u>properly endorsed by the RO</u>	on or before December 4, 2017	soft copy of write-ups in CD to be submitted to BCD or emailed to nstfs@deped.gov.ph .	BCD Staff Project proponents Project advisers Dept. Heads / Div. and Regional Science and Math Supervisors	RO to BCD-CSDD
Submission of entries to National SRCs	on or before December 15, 2017	Complete copies of write-ups	BCD Staff	Identified addresses
Meeting of SRCs members for deliberation and submission of consolidated SRC forms	January 9-10, 2018	Master list of participants Master list of SRCs Write-ups Evaluation Form for SRCs	Identified SRCs BCD Staff	BCD Conference Room
Meeting of RCs and return of manuscripts /write-ups to RCs	January 11-12, 2018	Affiliated Questionnaire matrix (master list of proponents using ISEF matrix) Evaluation Forms per project with SRC comments	RCs Project Proponents	BCD Conference Room
Submission of Revised Write-up to BCD	January 19, 2018	soft copy of revised write-ups in CD to be submitted to BCD or emailed at nstf@deped.gov.ph	Regional Coordinators BCD Staff	BCD-CSDD
Submission of write-ups to identified BOJs	January 22, 2018	one copy each of the identified BOJ	BCD Staff	Identified addresses
Actual conduct of the National STF	February 5-9, 2018	Display posters	Regional delegates Project advisers RCs and BOJ	To be announced
Online Mentoring of Top Entries	February to April 2018	Revised Research Papers	Participants, advisers, Research mentors, Regional supervisors and BCD staff	N/A
Science Cliniquing	May 6-12, 2018	Finalized Research Papers and Posters	Participants, advisers, Research mentors, Regional supervisors and BCD staff	To be announced

Format of Research Paper

Investigatory papers that were reviewed by the national SRCs in the past years were found to have inadequacies in the content, particularly in the areas cited below. To ensure that the investigatory papers are of good quality, students must adhere to the guidelines shown below. These can be found in the Guidelines and in the Student Handbook and Research Plan Instructions published in the website (<https://www.societyforscience.org>).

I. **Research Plan:** (This is compiled separately from the rest of the investigatory paper):

All projects should include the following:

- A. Question or Problem being addressed
- B. Goals / Expected Outcomes / Hypotheses
- C. Description in detail of method or procedures (The following are important and key items that should be included when formulating ANY AND ALL research plans.)
 - **Procedures:** Detail all procedures and experimental design to be used for data collection.
 - **Data Analysis:** Describe the procedures to be used to analyze the data/results that answer research questions or hypotheses.
- D. Bibliography: List at least five (5) major references (e.g. science journal articles, books, internet sites) from your literature review. If you plan to use vertebrate animals, one of these references must be an animal care reference.

II. **Project Data Book:**

A project data book is your most treasured piece of work. Accurate and detailed notes make a logical and winning project. Good notes show consistency and thoroughness to the judges and will help you when writing your research paper. Data tables are also helpful. They may be a little 'messy' but be sure the quantitative data recorded is accurate and that units are included in the data tables. Make sure you date each entry.

III. **Research Paper:**

A research paper should be prepared and available along with the project data book and any necessary forms or relevant written materials. A research paper helps organize data as well as thoughts. A good paper includes the following sections.

- a) **Title Page and Table of Contents:** The title page and table of contents allows the reader to follow the organization of the paper quickly.
- b) **Introduction:** The introduction sets the scene for your report. The introduction includes the purpose, your hypothesis, problem or engineering goals, an explanation of what prompted your research, and what you hoped to achieve.
- c) **Materials and Methods:** Describe in detail the methodology you used to collect data, make observations, design apparatus, etc. Your research paper should be detailed enough so that someone would be able to repeat the experiment from the information in your paper. Include detailed photographs or drawings of self-designed equipment. Only include this year's work.
- d) **Results:** The results include data and analysis. This should include statistics, graphs, pages with your raw collected data, etc.
- e) **Discussion:** This is the essence of your paper. Compare your results with theoretical values, published data, commonly held beliefs, and/or expected results. Include a discussion of possible errors. How did the data vary between repeated observations of similar events? How were your results affected by uncontrolled events? What would you do differently if you repeated this project? What other experiments should be conducted?

- f) **Conclusions:** Briefly summarize your results. State your findings in relationships of one variable with the other. Support those statements with empirical data (one average compared to the other average, for example). Be specific, do not generalize. Never introduce anything in the conclusion that has not already been discussed. Also mention practical applications.
- g) **Acknowledgements:** You should always credit those who have assisted you, including individuals, businesses and educational or research institutions. However, acknowledgments listed on a project board are a violation of D & S Display rules and must be removed.
- h) **References/Bibliography:** Your reference list should be written based on the Chicago Manual of Style. For more information, you may visit the websites below:

- <http://www.chicagomanualofstyle.org/home.html>
- <http://www.calvin.edu/library/knightcite/index.php>

IV. **Abstract:**

After finishing research and experimentation, an abstract should be written. This needs to be a maximum of 250 words on one page. It should include the a) purpose of the experiment, b) procedures used, c) data, and conclusions. It also may include any possible research applications. Only minimal reference to previous work may be included. The abstract must focus on work done in the current year and should not include a) acknowledgments, or b) work or procedures done by the mentor. See below for examples of award winning abstracts. See page 27 of the International Rules for the proper formatting of an Official Intel ISEF Abstract and Certification. Please Note: The official abstract form is only for those participating in ISEF. This form may not be required for other levels of competition.

Sample Abstracts

2002 ISEF First Grand Award, Physics	2002 ISEF First Grand Award, Microbiology
A Novel Application of Locally Formulated Cholesteric Liquid Crystals in Dosimetry	Antibiotic Substance Obtained from the Parotid Gland Secretions of the Toad (<i>Bufomarinus</i>)
By Estrella, Allan N., Macalintal, Jeric V., Manapat, Richard K.S. Adviser: Mr. Jonathan Derez Manila Science High School	By Rara, Prem Vilas Fortran M. Adviser: Dr. Jose M. Oclarit Integrated Development School-MSU-Iligan Institute of Technology
<p>Radiation has many industrial and economic uses. However, it poses a danger on those people working near it. To settle with this, dosimetry was introduced. Many kinds of dosimeters such as silver halides, thermoluminescent dosimeters, and semi-conductor dosimeters were developed. This study focuses on the potential use of liquid crystals as a dosimeter.</p> <p>Three mixtures of liquid crystals were prepared using nematic E48, cholesteric TM74A and Canola oil synthesized cholesteric liquid crystal with mass ratios (E48: TM74A) of Mixture A (Mixture A), 30:70 (Mixture B) and (E48: Canola) 30:70 (Mixture C). The liquid crystals were then mounted to cells made from polyethylene sheets. Three samples were prepared for each mixture. The samples were then exposed to cobalt-60 for gamma radiation with doses of 2.5 kgy, 5 kgy, 10 kgy, 15 kgy, 20 kgy, 25 kgy and 30 kgy. After each exposure, the samples were observed and color changes were noted.</p> <p>Color changes corresponding to different gamma radiation dose were observed in all samples. In all responses, the grand jean texture of the liquid crystals was restrained suggesting that the energy that was absorbed did not induce any chemical change. However, observed color changes indicated 'unwinding' of the pitch of the helical conformation for the TM74A-based formulation (Mixtures A and B) and 'winding' for the Canola-based liquid crystals (Mixture C). The application of liquid crystals in dosimetry was determined due to the color changes.</p>	<p>The study showed an antibiotic substance was obtained from the parotid secretions of a toad (<i>Bufomarinus</i>). This was isolated by extraction with methanol and initial purification by thin-layer and gravity column chromatography using aqueous methanol in varying concentrations as solvent. The crude extract was assayed on three test microorganisms (<i>Escherichia coli</i>, <i>Bacillus subtilis</i> and <i>Aspergillusniger</i>). Commercial antibiotics (Streptomycin and Penicillin) were used as controls to compare the potency of the compound. All test organisms were inhibited by the isolated compound, showing similar potency as that of the control antibiotics.</p> <p>Out of 30 fractions that were obtained from the gravity column chromatography only fractions 27-30 inhibited bacteria but not fungi, although at the initial experimentation, the crude extract, revealed effective inhibition against <i>Aspergillusniger</i>, a fungal test microorganism. Further purification of the active fractions using high performance liquid chromatography (HPLC) with aqueous methanol yielded a compound with retention time of 3.74 minutes. The compound was collected and assayed on the same test microorganisms. The active compound inhibited <i>E. Coli</i> and <i>B. Subtillis</i> at 30 and 40 mm, respectively. Infra Red (IR) spectrometry revealed amine, alkene and alkyl halides as functional groups. These spectrometric data revealed a trace of peptide spectra suggesting that the antibiotic principle is peptide-like molecule Bioassay of this compound demonstrated a comparable degree of antibiotic potency as that of streptomycin and penicillin with maximum inhibition of 45 mm in <i>B. subtilis</i> and 34 mm in <i>E. coli</i>.</p>

Data for Submission to BCD by the Regional Coordinators

(to be used in the official endorsement of the school to division, division to region and region to central office)

This should be in an **Excel spreadsheet** and should be sent to email address: nstfsecretariat@gmail.com on or before **December 8, 2017**. Please take note of the sample below:

Region: _____

Division: _____

No.	First Name	Middle Name	Last Name	Grade	High School	Gender	Team / Individual	Team Code	Research Adviser
1	Dona Vel	C.	Lagurin	10	Bayugan Nat'l Compre HS, Bayugan City	F	Individual	—	Jonathan f. Garzon
2	*Venessa Anne Kimberly	M.	Gealan	10	CARAGA RSHS, Surigao Cty	F	Team	1	Maria Ruth Edradan
3	*Quenee Lavern	G.	Pongcol	10		F	Team	1	
4	*Ivy Jean	J.	Turno	10		F	Team	1	
5	Bianca	A.	Muñez	10	Bunawan NHS, Agusan del Sur Bunawan NHS, Agusan del Sur Bunawan NHS, Agusan del Sur	F	Team	2	Jennyvi H. Papellero
6	Farrah Leah	U.	Ebe	10		F	Team	2	
7	El Veena Grace	A.	Rosero	10		F	Team	2	
8	Bryll Jay	I.	Salazar	9	Agusan del Sur NHS, Agusan del Sur	M	Individual	—	Emy S Dacoseo
9	Lea	S.	Aparente	10	Bayugan Nat'l Compre HS, Bayugan City	F	Team	3	Jonathan F. Garzon
10	Jayson Rey	R.	Vicariato	10		M	Team	3	
11	Justin Ryan	S.	Togonon	10		M	Team	3	

Prepared by _____ Mobile No. _____

School/Office Address and Phone No.: _____

Regional Coordinator: _____

Note:

1. **Team code number** is used to indicate the number of teams that joined the Division STF and the member of each team.
2. Include all the schools that participated in the Division STF.
3. Insert an *asterisk* before the first name of students who are qualified to join the National STF.
4. Insert an *asterisk* before the school name whose student-proponents are in the Special Science Classes of S&T-Oriented High Schools or Science, Technology and Engineering (STE) program .

CHECKPOINTS FOR SRC REVIEW

Source: Society for Science and the Public

This document was developed to provide guidance for the Scientific Review Committee to review a project after experimentation.

ABSTRACT

Review the abstract text and checkboxes keeping the following questions in mind, and then review the information provided on each form to see if it answers the questions, has any inconsistencies, etc. that will require follow up.

Did the area of study require **PRE-APPROVAL**?

Human Participants Does the study mention people, interviews, responses, answers, consent, etc? (requires Form 4). Exempt studies include product testing, public data review, some observational studies.

Animals Look for indications of type of study and research site. Strictly observational studies with no interaction are exempt. Tissue studies in which the student is given the tissue and did not interact with the animal do not need animal forms but will still need pre-approval as a PHBA [Potentially Hazardous Biological Agents] tissue study.

A. Projects may be conducted at home, school, or field ONLY IF the study involved agricultural, behavioral, observational, or supplemental nutrition AND was non-invasive AND had no negative effects on health and wellbeing (requires Form 5A).

B. Projects must be conducted at research institution with IACUC [Institutional Animal Care and Use Committee] in all other cases (requires Form 5B).

PHBA's Study included microorganisms, rDNA, or fresh/frozen tissue, blood, body fluids. Used terms like culturing, plating, tissue, source of tissue, etc. Exemptions include non-primate established cell lines, yeast, lactobacillus, meat from a grocery store, and other items listed in the rules (requires Form 6A; Tissue study, requires Form 6A & 6B)

Was the study done at a **Regulated Research Institute/Industrial Setting** (RRI)? Is the terminology or equipment very sophisticated? Look for possible RRI. (Form 1C)

Does this appear to be a **Continuation**? Any mention of previous research? Uses terms like previously, earlier research, improved, redesigned, year 3, etc. (Form 7)

Any discussion of a **Partner** in a non-team study? Uses "we" consistently (math projects and international studies frequently use "we" for all studies). Form 1C answers this question for studies done at a university.

Any possibly **hazardous chemicals, activities, or devices**? Includes high voltage, hazardous equipment, radioactivity, firearms, explosives, prescription drugs, DEA-controlled substances, alcohol and tobacco. (Form 3)

Time Line Project appears too long/too old: more than one year or started before January of last year. (Form 1A contains this information)

CHECKBOXES ON ABSTRACT

Checkbox 1. Project involved human participants, vertebrate animals, or PHBA's. Requires preapproval and additional forms. Exempt studies do not check this box.

Checkbox 2. Abstract may only reflect their work not the mentor's. May require abstract rewrite.

Checkbox 3. Worked at RRI. (Requires 1C)

Checkbox 4. Project is a continuation. (Requires Form 7, previous abstract & research plan)

CHECKLIST FOR ADULT SPONSOR (1)

This form asks more specifically about projects that required preapproval (humans, animals, PHBA's), continuations, RRI's, and lists the forms that are required. The answers to this checklist need to be consistent with the answers on other forms.

This page is signed when the project is reviewed which should be before the project starts.

STUDENT CHECKLIST (1A)

Grade: Student must have been in high school at the time of research in order to compete.

Contact information: If questions cannot be resolved from the paperwork, it is sometimes necessary to contact the student or adult sponsor. **Continuation:** If a continuation must include Form 7, previous abstracts, and last year's research plan. This information should match the checkmarks on the abstract and on Form 1.

Start/End Dates: Project may only be one year in length and may not have started before January of the previous year. Student should have competed in the first fair which was held after the end date. Fair dates can be found on SSP's website at http://apps.societyforscience.org/find_a_fair.

Information regarding Research Site: This will tell you if you need additional paperwork. For example, Form 1C for RRI, Form 5A if animals at school, field, home, Form 5B if animals at RRI, no culturing of microorganisms is allowed at home (FTQ) [Failing to Qualify], Form 6A for BSL-1 and BSL-2 studies which must be in the appropriate facilities.

RESEARCH PLAN

Review the research plan to find information regarding each of the questions asked in previous section under Abstract. The Research Plan Instructions page lists the items that should be included. The information should be written before the experiment is started (future tense), needs to be very detailed, and must be consistent with the documentation found on all other forms. If more information is needed about the study, the student or adult sponsor may need to be contacted (email, phone or interview).

Human Participants

Look for information about subjects (any risk groups), recruitment, methods, risks and benefits, protection of privacy (HIPPA [Health Insurance Portability and Accountability Act] and FRPA [Family Educational Rights and Privacy Act]), and informed consent (participant knows what they are being asked to do, that they may withdraw at any time, there is no coercion, etc.). Must have preapproval and often will require written consents. (Requires Form 4)

Is the level of risk appropriate? What risk assessment was done? Should the study have written consent/permission/assent? Is the survey attached?

Animals:

Pay particular attention to the detailed procedures and care of the animals in the research and if they looked for alternatives to animal research. Studies conducted in non-regulated sites are only allowed if they involved agricultural, behavioral, observational, or supplemental nutrition AND involved only non-invasive and non-intrusive methods that do not negatively affect an animal's health or well-being. All others must be at RRI's. (Requires 5A or 5B)

Look for any potential FTQ items such as no indication of preapproval, any animal deaths due to experimental procedures, weight loss $\geq 15\%$ in any group or subgroup, toxicity studies, studies designed to kill, studies which cause more than momentary pain or suffering, predator/prey, inappropriate water or food restriction, euthanasia by student, etc. Ensure that an allowable embryonic study didn't hatch and become a vertebrate study that is not permitted.

PHBA's:

The source, quantity, and Biosafety Level (BSL) must be indicated for all microorganisms including established cell lines; however, only plant and non-primate established cell lines will not require preapproval or Form 6A.

Culturing of microorganisms may NOT be conducted at home. (FTQ) All BSL-1 studies must be conducted at a BSL-1 facility or higher. If a petri dish or culture container with unknown or BSL-2 microorganisms is opened, it becomes a BSL-2 study and may only be conducted at a BSL-2 facility. (FTQ if opened, subcultured, etc. in BSL-1 lab.) Most high school laboratories are BSL-1 facilities but it is possible that a high school could meet the more stringent requirements of a BSL-2 lab (see BSL-2 checklist). (Requires Form 6A and sometimes 6B.) BSL-3 or BSL-4 studies and studies designed to engineer bacteria with multiple antibiotic resistance are not permitted.

Procedures to minimize risk must be clearly indicated. rDNA studies require close review to ensure proper oversight. Proper disposal methods must be listed (autoclaving, 10% bleach solution/sodium hypochlorite, biosafety pick up, etc.).

Hazardous: Look for detailed descriptions of risks and safety precautions and procedures used including methods of disposal.

APPROVAL FORM (1B)

Dates: Signatures from student and parent should be before the start date shown on 1A.

Pre-approval #2a: Must be signed by SRC or IRB before experimentation begins (Start date on 1A) for human, animal, and PHBA studies but possible FTQ if no preapproval is documented.

Post-approval #2b: SRC signs after experimentation ends (end date on 1A) if the study was conducted at a RRI. Institutional approval forms must also be submitted. (Possible FTQ) Note: Some fairs will have the fair SRC pre-review a study before it is done at an institution, even if it is approved before experimentation by the institution, and then will also post-approve after the study is complete. They will therefore sign both boxes. Usually, however, it is either pre- or post-approval, not both.

Final SRC Approval: This is signed after the project is complete (end date Form 1A) and immediately before competition.

REGULATED RESEARCH INSTITUTION FORM (1C)

The information provided by the scientist on this form must be consistent with what the student answered on other forms. It must not be filled out by the student. This form is posted so the judges can easily see exactly what the student did rather than what the mentor or others in the research group did. All information must be on the form not “see attached.” This form may only be from a university, college, or industrial site and may not be from their high school.

Checkboxes a) and b) help determine who did what and where.

Questions:

1. “Have you reviewed the rules” helps determine the amount of oversight and if an error was made in following the rules, if this an adult problem or a student problem or both.
2. “How did student get idea” helps determine originality by student.
3. “Was student part of a research group” indicates whether student worked with another high school student, which is only allowed for team projects not individual, or was part of a larger team of adult researchers, undergraduate or graduate students, which is allowed. Students are judged only on their own work, so it needs to be clear what part of the study was done by the entire group or the mentor and what was the student’s work.
- 4-5. “What procedures” and “how independent” again help indicate what was actually done by the student.

Continuation: Frequently, the mentor will say “the student worked with me last year” or “in his previous research” or list dates of research which will indicate that the study must be treated as a continuation with Form 7, etc. It also could indicate that the study is too old, too long, or that the student is presenting multiple years of research.

This form is signed by the mentor AFTER the study is completed (End date on 1A).

QUALIFIED SCIENTIST FORM (2)

Look for answers that are consistent with the information on other forms. For example, if the scientist marks yes to ‘used humans’ but other human subject forms aren’t present, will need to clarify. Any yes responses on #2 will require documentation on additional forms.

This form documents the amount of oversight that the student had and the safety precautions needed. The QS and DS review the study before the experiment begins. All approval signatures must be before research begins (Start date on 1A).

Even when not required, this form may be submitted to show the oversight of the study.

RISK ASSESSMENT FORM (3)

Documents that both the student and the supervisor have assessed the risks involved in the research and describes what safety precautions and procedures are needed including the disposal procedures. This form is completed before experimentation (start date on 1A).

This risk assessment is required for hazardous chemicals, activities, or devices, and for some PHBA's including protists, composting, coliform water test kits, decomposition of vertebrate organisms, etc.

Even when not required, this form may be submitted to show the oversight of the study.

HUMAN SUBJECTS FORM (4)

Make sure Form 4 is complete including decision checkmarks in the box and all 3 signatures. Missing checkmarks or signatures indicates no documentation of prior review and therefore could Fail to Qualify. All approval dates must be before research begins. (start date on 1A.)

Research Plan Refer to the research plan for subject information: any risk groups, recruitment, methods, risks and benefits, protection of privacy (HIPPA & FRPA), and informed consent (participant knows what they are being asked to do, that they may withdraw, no coercion, etc).

Risk Level Is the level of risk marked appropriate? Was a risk assessment done? Should the study have written consent/permission/assent? Is the survey attached?

HUMAN INFORMED CONSENT FORM

Does the form clearly explain what the participant is being asked to do, how long it will take, the potential risks and steps that will be taken to mitigate risk, the benefits to the participant or to society, how confidentiality will be maintained, that it is completely voluntary and that they may withdraw at any time?

Adult participants sign giving their consent, minors give their assent, and parents of participants give permission. All approval signatures must be before research begins (start date on 1A).

VERTEBRATE ANIMAL FORM (5A)

Since these animals are not in a research institution, which would provide a high level of oversight, special attention must be paid to the housing and husbandry that will be provided by the student. The final disposition of the animals must also be appropriate. Any death, illness, or unexpected weight loss must have been investigated and documented by an attached letter from the QS, DS, or a veterinarian. If there were any deaths due to the experimental procedure, the project will Fail to Qualify.

All approval signatures must be before research begins (Start date on 1A). Capture and Release approvals must be attached when applicable.

VERTEBRATE ANIMAL FORM (5B)

Research which causes more than momentary pain or suffering is prohibited. Appropriate use of anesthetics, analgesics and/or tranquilizers must be documented. Any death, illness, or unexpected weight loss must have been investigated and documented by an attached letter from the QS, DS, or a veterinarian.

Euthanasia by student researchers is prohibited so the final disposition of the animals should also be indicated. If there were any deaths due to the experimental procedure, the project will Fail to Qualify.

If tissues were collected, how were they obtained and how will they be used?

The IACUC approval forms must be attached. They must clearly cover this study and must indicate that the study was approved before the start of the student research. Not all IACUC approval documentation will list the student individually, but the student research training must be indicated on the Form 5B. A letter from the QS or Principal Investigator indicating that the study had IACUC approval is not sufficient.

PHBA FORM (6A)

Identification, Including Biosafety Level (BSL) The source, quantity, and BSL must be indicated. A plant or non-primate established cell line will not require Form 6A but the student may fill out this form in order to document that it is from ATCC, etc. However, human and other primate established cell lines and tissue cultures require Form 6A.

Prohibited Studies BSL-3 or BSL-4 studies, and studies which are designed to engineer bacteria with multiple antibiotic resistance are not permitted. (FTQ)

Site Microorganisms may NOT be cultured at home. (FTQ) All BSL-1 studies must be conducted at a BSL-1 facility or higher. If a culturing plate with unknown microorganisms is opened, except for disinfection or disposal, it becomes a BSL-2 study and may only be conducted at a BSL-2 facility. FTQ if opened, subcultured, etc. in BSL-1 lab. Most high schools are BSL-1 facilities but it is possible that a high school could meet the more stringent requirements of a BSL-2 lab (see BSL-2 checklist).

Risk Reduction Procedures to minimize risk must be clearly indicated. rDNA studies require close review to ensure proper oversight.

Disposal Proper disposal methods must be listed: autoclaving, bleach solution, biosafety pick up, etc.

Approval Dates All approval signatures must be before research begins (start date on 1A.)

HUMAN AND VERTEBRATE ANIMAL TISSUE FORM (6B)

Students may conduct tissue studies with tissue they are given from an IACUC approved study within a research institution but the animal may not be euthanized solely for the student's tissue study. The first checkbox in the signature box indicates this.

The second checkbox in the signature box is marked to indicate that the substances were handled in accordance with the safety standards for Blood Borne Pathogens.

All approval signatures must be before research begins (start date on 1A).

CONTINUATION FORM (7) Previous Year's Abstract & Research Plan

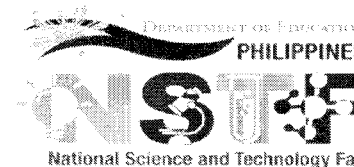
This form is posted with the project so that the judges can tell at a glance exactly what was new and different about this year's study. All information must be on the form, not "see attached." Because research projects may only be one year's work, they will be judged on the current work only not on previous work, and this form is used to document current versus previous research. Previous Intel ISEF projects can be searched at <https://apps2.societyforscience.org/abstracts/> .

Frequently, students don't wish to call their project a continuation, but it is good research to continue a line of investigation even when the focus is now totally different. If the study is in the same field, if anything they learned in a previous year helped with the current study, or if the current study refers to any earlier research, then it is a continuation and Form 7 and previous abstract and research plan are required.

Repetition of a previous study that reflects no changes but simply retests or increases sample size is not permitted.

A longitudinal study, in which time is a critical variable, is permitted but the original data from previous years cannot be presented only the comparison between years.

NSTF Scientific Review Committee (SRC) Review & Recommendation Report



Project Title: _____
Fair Division: [] Life [] Physical/Applied **Category:** [] Individual [] Team

Instruction: Please put a check [✓] in the appropriate column and if necessary, write recommendations in the space provided.

PART 1: REQUIRED FORMS FOR ALL RESEARCHES	Complete	Incomplete	Recommendations
1. Checklist for Adult Sponsor (1). Is it accomplished and signed?			
2. Student Checklist 1A. Is it accomplished and signed?			
If answer to item 5 is YES , must also have Form 7 (See Part II, item 13 below)			
If answer to item 7 is Research Institution or Other , must also have Form IC (See Part II, item 6 below)			
3. Research Plan (Attachment to item 2, above). Does it include the following:			
A. RATIONALE. Does it Include a brief synopsis of background that supports the research problem and explains why the research is important scientifically? If applicable, does it explain the societal impact of the research?			
B. HYPOTHESIS(ES), RESEARCH QUESTION(S), ENGINEERING GOAL(S), EXPECTED OUTCOMES. Is this based on RATIONALE?			
C. RESEARCH METHODS AND CONCLUSIONS			
a. Procedures. i. Does it show all procedures and experimental designs, including methods for data collection?			

<ul style="list-style-type: none"> ii. There should be NO inclusion of work of mentor or others. iii. Parameters should NOT be too strict to allow for possible changes 			
<ul style="list-style-type: none"> b. Risk and Safety. Does it identify all potential risks and safety precautions needed? 			
<ul style="list-style-type: none"> c. Data Analysis. <ul style="list-style-type: none"> i. Does it describe all procedures for data analysis? ii. Parameters should NOT be too strict to allow for possible changes 			
<ul style="list-style-type: none"> D. BIBLIOGRAPHY. Does it have at least 5 major references? If using vertebrate animals, include 1 reference on animal care. 			
<p>Note: Items 3.E-H are needed ONLY for researches on HUMAN PARTICIPANTS, VERTEBRATE ANIMAL, POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS (see attached Research Plan/Project Summary Instructions)</p>			
<ul style="list-style-type: none"> E. HUMAN PARTICIPANTS RESEARCH. Does it provide for the following? <ul style="list-style-type: none"> a. Description b. Recruitment c. Methods d. Risk Assessment e. Protection of Privacy f. Informed Consent Process 			
<ul style="list-style-type: none"> F. VERTEBRATE ANIMAL RESEARCH. Does it provide for the following? <ul style="list-style-type: none"> a. Potential ALTERNATIVES to vertebrate animal use b. Potential impact or contribution of research c. Detailed procedures d. Detail animal numbers, strain, sex, age, source, etc. e. Describe housing and oversight of daily care f. Disposition of animals at study termination 			

G. POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS RESEARCH. Does it provide for the following? a. Biosafety Level (BSL) Assessment and determination b. Source of agent, specific cell line. c. Safety precautions d. Methods of disposal			
H. HAZARDOUS CHEMICALS, ACTIVITIES and DEVICES. Does it provide for the following? a. Risk Assessment process and results b. Chemical concentrations and drug dosages c. Safety precautions and procedures to minimize risks d. Methods of disposal			
4. Approval Form 1B (for ALL students)			
5. Abstract			
VERY IMPORTANT 2: See Part II, Risk Assessment (3) for			
<ol style="list-style-type: none"> 1. Studies involving protists, archaea and similar microorganisms. 2. Research using manure for composting, fuel production, or other non-culturing experiments. 3. Commercially-available color change coliform water test kits. These kits must remain sealed and must be properly disposed. 4. Studies involving decomposition of vertebrate organisms (such as in forensic projects). 5. Studies with microbial fuel cells. 			

PART 2: ADDITIONAL REQUIRED FORMS	Complete	Incomplete	Recommendations
6. Regulated Research Institutional or Industrial Setting Form (1C). Must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution or any work site aside from home, school or field. Is it properly accomplished and signed by the DESIGNATED SUPERVISING ADULT?			
7. Qualified Scientist Form (2) – for researches with human participants, vertebrate animals, potentially hazardous biological agents, Drug Enforcement Administration (DEA)-controlled substances; completed and signed BEFORE			

start of experimentation. Is it properly accomplished and signed by the QUALIFIED SCIENTIST?			
8. Risk Assessment Form (3) – for researches using hazardous chemicals, activities or devices and microorganisms exempt from pre-approval. Must be completed BEFORE experimentation. Is it properly accomplished and signed by DESIGNATED SUPERVISING ADULT OR QUALIFIED SCIENTIST (when applicable)?			
9. Human Participants Form (4) – for researches involving human participants not at a Regulated Research Institution. Did the the DESIGNATED ADULT SUPERVISOR/ INSTITUTION approve the research BEFORE experimentation?			
10. Vertebrate Animal Form (5A) – for researches involving vertebrate animals that is conducted in a school/home/field research site. A. Is it properly accomplished, approved and signed by SRC BEFORE experimentation? B. Is it properly accomplished, approved and signed by DESIGNATED VETERINARIAN BEFORE experimentation? C. Is it properly accomplished, approved and signed by DESIGNATED SUPERVISOR OR QUALIFIED SCIENTIST (as applicable) BEFORE experimentation?			
11. Vertebrate Animal Form (5B) – for researches involving vertebrate animals that is conducted at a Regulated Research Institution. A. Does it have IACUC approval BEFORE experimantation? B. Is it properly accomplished, approved and signed by a QUALIFIED SCIENTIST/PRINCIPAL INVESTIGATOR?			
12. Potentially Hazardous Biological Agents Risk Assessment Form (6A) – for researches involving microorganism, rDNA, fresh/frozen tissue (including primary cell lines, human and			

<p>other primate established cell lines and tissue cultures), blood, blood products and body fluids.</p> <p>A. Does it have SRC/IACUC/Institutional Biosafety Committee (IBC) approval BEFORE experimentation?</p> <p>C. Is it properly accomplished, approved and signed by a QUALIFIED or DESIGNATED SUPERVISOR BEFORE experimentation?</p> <p>D. Is it properly accomplished, approved and signed by the SRC BEFORE experimentation?</p>			
<p>E. Human Vertebrate Animal Tissue Form (6B) – for researches 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 research involves living organisms, ensure that the proper human or animal forms are completed. All researches using any tissue listed above must also complete Form 6A. Is it properly accomplished, approved and signed by a QUALIFIED or DESIGNATED SUPERVISOR BEFORE experimentation?</p>			
<p>13. Continuation/Research Progression Projects Form (7) – for researches that are a continuation/progression in the same field of study as a previous research.</p> <p>A. This form MUST be accompanied by the PREVIOUS YEAR'S ABSTRACT and RESEARCH PLAN</p> <p>B. Is it properly accomplished, approved and signed by the student/s?</p>			

PART 3: RESEARCH PAPER (See attached IMRAD Format)	Complete	Incomplete	Recommendations
1. COVER PAGE			

<p>A. Is the research title present?</p> <p>B. Is/Are the name/s of the student proponent's present?</p> <p>C. Is/Are the appropriate persons credited? (The Research adviser and Research Consultants, if applicable MUST be present)</p>			
<p>2. INTRODUCTION. Does it outline the research question and its significance within the topic discussed, making its relevance clear to readers in a CONCISE manner?</p>			
<p>3. METHOD. Does it clearly and comprehensively provide the reader with a description of the methods used in the research?</p>			
<p>4. RESULTS. Does it clearly and comprehensively SHOW the reader what the research came up with? This should be the MAIN section of the paper.</p>			
<p>5. DISCUSSION. Does this show what the findings in RESULTS mean?</p>			
<p>6. LIMITATIONS ON THE RESEARCH DESIGN AND MATERIAL. Does this show knowledge and understanding of research limitations?</p>			
<p>7. CONCLUSION, NOTES, WORKS CITED AND APPENDICES/BIBLIOGRAPHY</p> <p>A. Does the conclusion briefly and clearly analyze what the paper proposed, discussed and concluded?</p> <p>B. Is there in (MLA format) possible Researcher Notes, the research paper's Works Cited and possible appendices?</p>			

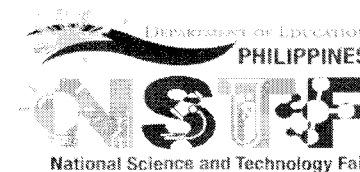
PART 4: RESEARCH ABSTRACT (MAX. 250 WORDS)	Complete	Incomplete	Recommendations
<p>1. Does it clearly and concisely state the PURPOSE OF THE RESEARCH?</p>			
<p>2. Does it clearly and concisely state the PROCEDURE/S undertaken in the RESEARCH</p>			
<p>3. Does it clearly and concisely state the DATA COLLECTED from the RESEARCH?</p>			
<p>4. Does it clearly and concisely state the CONCLUSIONS OF THE RESEARCH?</p>			

<p>VERY IMPORTANT: There should be NONE of the following:</p> <ul style="list-style-type: none"> a. Acknowledgements of the research institutions and/or mentors with which the student were working b. Self-promotions and external endorsements c. Inclusion of work or procedures done by the mentor 		

PART 5: RESEARCH LOGBOOK	Complete	Incomplete	Recommendations
1. Is the logbook intact and not tampered with? It should NOT be loose-leafed.			
2. Does the START DATE in the logbook match the START DATE in Student Checklist (1A)?			
3. Does the END DATE in the logbook match the END DATE in Student Checklist (1A)?			
4. Are all the entries in the logbook properly dated?			
5. Does the logbook show accurate and detailed notes and findings throughout the course of the research? Does it include data tables, and the like?			
6. Does the logbook show accurate and detailed description of procedures and processes conducted in the course of the research?			
7. Does the logbook show student notes and questions in the course of the research?			

[] Review Complete [] Review Incomplete Prepared by: _____ Date: _____

NSTF Board of Judges (BOJ) Project Evaluation Form



Title of Research Project: _____

Project Proponent/s: _____

School: _____

Project Category: Life Science Physical Science
 Team Individual

Category	Score
<p>1. Creative Ability (30)</p> <p>1. Does the project show creative ability and originality in the:</p> <ol style="list-style-type: none"> questions asked? approach to solving the problem? analysis of the data? interpretation of the data? use of equipment? construction or design of new equipment <p>2. Creative research should support an investigation and help answer a question in an original way.</p> <p>3. A creative contribution promotes an efficient and reliable method for solving a problem. When evaluating project, it is important to distinguish between gadgeteering and ingenuity.</p>	
<p>2. Scientific Thought (30) (If an engineering project, please see 2b. Engineering Goals.)</p> <ol style="list-style-type: none"> Is the problems stated clearly and unambiguously? Was the problem sufficiently limited to allow plausible attack? Good scientists can identify important problems capable of solutions. Was there a procedural plan for obtaining a solution? Are the variable clearly recognized and defined? If controls were necessary, did the student recognize their need and were they used correctly? Are there adequate data to support the conclusions? Does the finalist/team recognize the data's limitations? Does the finalist/team understand the project's ties to related research? Does the finalist/team have an idea of what further research is warranted? Did the finalist/team cite scientific literature, or only popular literature (e.g. local newspapers, magazines)? 	

<p>b. Engineering Goals</p> <ol style="list-style-type: none"> 1. Does the project have a clear objective? 2. Is the objective relevant to the potential user's needs? 3. Is the solution: workable? Acceptable to the potential user? Economically feasible? 4. Could the solution be utilized successfully in design or construction of an end product? 5. Is the solution a significant improvement over previous alternatives or application? 6. Has the solution been tested for performances under the conditions of use? 	
<p>3. Thoroughness (15)</p> <ol style="list-style-type: none"> 1. Was the purpose carried out to completion within the scope of the original intent? 2. How completely was the problem covered? 3. Are the conclusions based on a single experiment or replication? 4. How complete are the project notes? 5. Is the finalist/team aware of other approaches or theories? 6. How much time did the finalist or team spend on the project? 7. Is the finalist/team familiar with scientific literature in the studied field? 8. Are the relevant details (<i>including the pages and dates</i>) of the experiment recorded in the research data logbook? 	
<p>4. Skill (15)</p> <ol style="list-style-type: none"> 1. Does the finalist/team have the required laboratory, computation, observational and design skills to obtain the supporting data? 2. Where was the project performed (i.e. home, school laboratory, university laboratory) Did the student or team receive assistance from parents, teachers, scientists or engineers? 3. Was the project completed under adult supervision, or did the student/team work largely alone? 4. Where did the equipment come from? Was it built independently by the finalist or team? Was it obtained on loan? Was it part of a laboratory where the finalist/team worked? 	
<p>5. Clarity (10)</p> <ol style="list-style-type: none"> 1. How clearly does the finalist or team discuss his/her/their project and explain the purpose, procedure, and conclusions? Watch out for memorized speeches that reflect little understanding of principles. 2. Does the written material reflect the finalist's or team's understanding of the research? 3. Are the important phases of the project presented in an orderly manner? 4. How clearly is the data presented? 5. How clearly are the results presented? 6. How well does the project display explain the project? 7. Was the presentation done in a forthright manner, without tricks or gadgets? 8. Did the finalist/team perform all the project work, or did someone help? 	
<p>TOTAL</p>	
<p>Signature over printed name of the members of the board of judges</p>	