



New Mexico Governor's STEM Challenge

EVALUATION & JUDGING





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2019-20 NEW MEXICO GOVERNOR'S STEM CHALLENGE

RUBRIC AND EVALUATION SYSTEM HANDBOOK

OVERVIEW:

Thank you for participating in the 2019-20 New Mexico (NM) Governor's STEM Challenge as a partnered industry sponsor. Students statewide rely on committed and allied employers to ensure a pipeline for local STEM opportunities and careers. Your assessment and selection of choice projects created by student teams for the STEM Challenge will recognize success and potential in NM's diverse student population and demonstrate the dedication of NM's STEM professionals to supporting economic development and local jobs.

The following document outlines the evaluation process for company representatives (also referred to as Judges) to determine and award choice STEM Challenge teams \$5,000 education grants. The general overview is as follows:

- 1) Companies will submit criteria for the types of student projects they want to review and potentially award funds to, based on areas of interest/expertise/applicability.
- 2) Student teams submit proposal packets on November 22, which are sorted and assigned to companies for review based on previously conveyed areas of interest.
- 3) Companies will evaluate and score each of their allotted teams' proposal packets by December 5 (see *Evaluation System and Rubric*).
- 4) Company representatives will attend the Statewide Showcase in Los Lunas, NM, on December 7 to evaluate these respective teams in person, based off prototype demonstrations and interviews.
- 5) After evaluating day-of, company representatives will submit their first, second, and third choices for which student team they want to sponsor. In the case of multiple companies wanting to sponsor the same team, representatives will discuss and deliberate the different projects to reach consensus and assure the top teams are optimally matched to participating companies and awarded prize funds.

This guide was designed to establish a consistent and shared protocol, help student teams focus their competitive approach, and create a transparent evaluation and award process.

Important Update:

This being the inaugural year of the STEM Challenge, a decision was made to adjust the structure and invite **all** participating student teams to present at the Statewide Showcase (hereafter referred to as "Showcase") instead of selecting the winning projects ahead of time and only inviting those teams. This decision reflects the importance of giving student teams the opportunity to demonstrate their prototype solution in person, leading to a more equitable evaluation and affirmation of the time and effort invested by each team.



SHOWCASE SCHEDULE

- 08:00 - 9:00 ~ Team check-in, prototype setup
- 09:00 - 9:30 ~ Opening ceremony in auditorium
- 9:30 - 12:00 ~ Open-floor showcase demonstrations and evaluations
- 12:00 - 13:00 ~ Judge deliberations
- 13:30 - 15:00 ~ Award Ceremony and closing remarks

SHOWCASE NUTS & BOLTS:

- Prior to the Showcase, all teams planning on attending will register and convey any special needs for their prototype demonstration including tables, chairs, power, etc.
- Each team will be assigned a **10' x 10'** area in the gymnasium marked out by tape and a sign indicating their school and team name.
- Prior to the Showcase the teams will have practiced their demonstrations and prepared a presentation around 5-10 minutes in length leaving time for questions.
- Judge's nametags will have a signifying banner so students can easily differentiate between an official Judge and a guest or supporter of another team.
- After evaluating a team, the Judge will sign a form that each team will receive during check-in to keep track of assigned evaluator visits.
- Once teams have received their assigned evaluations, student team members are permitted to take a break, eat lunch, visit other team's demonstrations, etc.
- Guests and team supporters (family members, teacher sponsors, etc.) are instructed to be respectful during the judging period and give teams a wide berth when actively demonstrating and/or being interviewed by a Judge.

KEY CONCEPTS:

The measurement of each team's project will include consideration of their product, process, and personalities/teaming. While the rubric is quantitative in nature, Judges are expected to apply their qualitative judgement when making a final decision on all awards.

In addition to the industry-sponsored \$5,000 education grant, qualitative awards will be given to teams identified as deserving special recognition. Judges will consider a number of possible criteria for this award, such as team presentation or special attributes, exemplary effort and perseverance at the event, and team accomplishments or endeavors throughout the semester that may not fall under existing monetary award criteria but are nonetheless deserving of special recognition. These qualitative awards will be evaluated and given out at the Showcase award ceremony, based off Judges' interactions with student teams:



- Special Effort
- Perseverance
- Extraordinary Community Involvement
- Creative Engineering
- Teamwork

OUTCOME GOALS:

The judging process will evaluate and select ideal teams for recognition and monetary awards, and provide an opportunity for student teams to receive feedback on areas for improvement. Student teams should be judged not only on their ability to demonstrate STEM hard skills, but also on their professionalism, cooperation, leadership, and communication. The qualitative awards will recognize specific contributions that teams and team members brought to the STEM Challenge and Showcase, and create an opportunity to honor particular skill sets, showmanship, and special circumstances or obstacles overcome.

DECISION PROCESS & TIMELINE

Student teams will submit proposals of their prototype/model by **November 22**. These portfolio-style "proposal packets" (comprised of an executive summary, written plan, and slide deck) will be assigned to companies in relation to areas of expertise and interest. Each company will ideally review no more than eight (8) submissions. Company Judge(s) will receive the zipped-file proposal packets electronically, and submit their evaluations to the Statewide Showcase Coordinator Anjeli Doty via email (adoty@lanl.gov) by **December 5**.

At the Showcase on **December 7**, Judges will evaluate assigned teams in-person to determine the remaining part of the score based off prototype demonstrations and personal interactions and interviews with the teams. Judges will also recommend the recipients of qualitative awards using the attached criterion.

EVALUATOR RESPONSIBILITIES

To ensure that every STEM Challenge team receives a fair evaluation and opportunity to receive award funds, Judges must maintain:

- **Confidentiality:** The judging process will inevitably include frank conversations and constructive criticism about student team proposals. This information must remain



confidential, and caution taken to keep all evaluatory discussions private during interactions at the Showcase event. Do not discuss awards or judging with teams after the event; please direct any questions to the Showcase coordinators.

- **Objectivity:** Proposals will be assigned to Judges in accordance with areas of STEM expertise. Please disclose any potential conflicts of interest including nepotism to the Showcase Coordinator, and remain uninvolved from conversations or decisions in which personal interest may play a role.
- **Commitment:** Judges must show dedication and timeliness in the decision-making process for selecting teams to present at the Showcase, due to the short turnaround time. At the Showcase event, we encourage all participants and Judges to stay involved and avoid distractions such as work, electronics, or side conversations.

In preparation for the Showcase event, Judges should:

1. Review the White Paper/Program Overview of the STEM Challenge
2. Review their assigned teams' proposals, evaluation scores, and backgrounds
3. Review the award categories to be determined and respective criterion
4. Review the event location and schedule
5. Plan to wear team-neutral attire that represents your industry or business

During the event, Judges should:

Evaluate teams using the provided criteria and ranking system. To complete all evaluations within the time period, Judges are recommended to visit and interview one team every 15-20 minutes. Judges will be provided with a list of designated teams they are responsible for interviewing and ranking. Once completed, Judges may freely interact with additional teams based on personal interest and identification of relevant skills needed for local employment, but auxiliary information and evaluations gained in addition to Judges' assigned teams will *not* be permissible for inclusion in final deliberations. Judges will be assigned to meet with a selection of teams to conduct a fair comparison, but should not feel pressured to rush interactions in order to interview extra teams outside their primary interviewee list.

Interact face-to-face with student teams to identify interpersonal and professional skills. Ask questions that encourage complex answers from student teams and express genuine interest in their models and explanations. Try to draw out reserved and quiet team members using directed questions; see the *Resources* section for sample questions.

Recognize the range of privilege and experiences of students, and judge mindfully in relation to students' relative backgrounds and levels of socioeconomic status. Remember that the STEM Challenge was designed to encourage participation from underrepresented groups in STEM such as girls and minorities; individuals representing these groups will



inevitably face different challenges and obstacles, the overcoming of which should be considered during evaluations.

Record evaluations discreetly using provided criteria, and submit to the Showcase Coordinator prior to final deliberations to determine award recipients. Take additional notes to enhance input and memory during deliberations, and use care that such notes are submitted with confidentiality to the Showcase Coordinator for disposal following the event.

Attend and participate in the opening ceremony (if possible) and the closing award ceremony to present your organization's check.

Express any concerns or questions to the Showcase Coordinator or event staff.

During deliberations for Showcase awards, Judges should:

1. Submit evaluations to the Showcase Coordinator before the deliberation period
2. Collaborate and converse with other Judges to achieve consensus
3. Exercise the same level of dedication used to evaluate prior student team proposals
4. Express any questions or concerns to Showcase management staff
5. Submit all evaluation notes and rankings once concluded for confidential disposal

EVALUATION SYSTEM AND RUBRIC

PART 1: PROPOSAL PACKET

Scientific exploration and prototype development is an iterative process whereby students recognize and define a problem, brainstorm and work through various stages of the design process, test their design, continue to improve their design, and continue in the process until establishing a stable solution. During this process, students will come across obstacles, encounter instances of success and failure, and learn many lessons. It is this iterative process that students should document in their proposal packet.

The proposal packet is comprised of three components: (1) an executive summary, (2) a written plan, and (3) a slide deck. The proposal packet can garner up to 50 points derived from 10 categories worth up to 5 points each, and represents the first half of a team's score. When filling out the score sheet, Judges should evaluate the entire proposal packet (all three components) as if it were **one entity**. Some teams will show greater strength in certain components than others, but the final score assigned to the proposal packet should reflect each Judge's overall impression of its quality and completeness.



Instructions:

1. Read through criteria for evaluation
2. Read through all three components (summary, essay, slide deck) of proposal packet
3. Fill out score sheet based on cumulative/holistic impression of all three components

Note: students must list the cost of all items used for their prototype. Common recycled items such as glass jars or plastic tubs may be assigned a zero cost value. Other used, donated, or borrowed items must be assigned a fair market or salvage value.

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Proposal Packet Scoresheet

Judge & Company Name: _____ Date: _____

School Name: _____ Team Name: _____

Score	Evaluation
5 (Excellent)	All criteria are met or followed with rare mistakes or deviations
4 (Great)	Most criteria are met with only a few mistakes
3 (Good)	Many criteria are met, but there are many mistakes/deviations
2 (Fair)	Many criteria are not met and/or there are many mistakes
1 (Poor)	Most criteria are not met
0 (No Effort)	No effort to meet criteria

Criteria for Evaluation	5	4	3	2	1	0
Identifies the problem:						



<ul style="list-style-type: none"> • Demonstrates background of the problem, including previous research and work done by others • Discusses and clarifies constraints • Clearly states main goal and mission of project 						
<p>Idea generation and design choice:</p> <ul style="list-style-type: none"> • Discusses the creative and collaborative decision-making process • Shows various ideas considered to solve problem • Explains why selected approach was taken and if applicable, why other ideas were not chosen 						
<p>Model/prototype design:</p> <ul style="list-style-type: none"> • Understanding of scientific/engineering method and proper application • Describes the engineering process in detail; paints a picture • Lists materials and cost (to not exceed \$500) • Presents compelling usage plan for how prototype would function and be integrated • Identifies how safety and protocol were used/observed 						
<p>Model testing process:</p> <ul style="list-style-type: none"> • States hypothesis developed • Discusses testing and troubleshooting through all cycles • Discusses strengths and weaknesses • Data tables (if included) are complete and well-organized 						
<p>Refinements to model:</p> <ul style="list-style-type: none"> • Discusses modifications/refinements to improve/adjust design • Improvements on design are based on test results • Modifications are documented • Discussion of additional trials after modifying (if conducted) • Reflections show great insight and understanding of process and project goals 						
<p>Effectiveness and quality of design:</p> <ul style="list-style-type: none"> • Design effectively addresses given problem • Design is plausible and not unrealistic 						



<ul style="list-style-type: none"> • Accounts for risks and benefits if implemented large-scale • Completed work is sufficient to move the respective field forward • If not functional, explanation given for how it <i>could</i> work and why students were unable to make it work 						
<p>Overall executive summary:</p> <ul style="list-style-type: none"> • Effective “elevator pitch:” conciseness and focus • Shows the problem in way that captures attention • Explains the solution and basic findings/results • Compels by presenting future possibilities 						
<p>Overall written plan:</p> <ul style="list-style-type: none"> • Includes all scored elements • Documents design process • Explains functionality • Responds to anticipated contradictions and challenges • Well-written, readable scientific writing 						
<p>Overall slide deck:</p> <ul style="list-style-type: none"> • Visually engaging • All slides bear relevance/importance to presentation (i.e., no “fluff”) • Utilizes multimodality to compliment rather than repeat content in written plan 						
<p>Overall presentation of proposal packet:</p> <ul style="list-style-type: none"> • Well-organized with clear introduction, body, and conclusion • Discusses all areas of the design process • Clear communication (verbally and visually) with appropriate data, sketches, graphs, pictures, etc. • Attention to appropriate use of language and terminology • Includes contributions from all team members • Spelling, grammar, neatness 						
<p>Total:</p>						



EVALUATION SYSTEM AND RUBRIC

PART 2: SHOWCASE DEMONSTRATION AND INTERVIEW

Scientists communicate with a variety of professionals every day. Being able to talk about ideas and solutions clearly and succinctly is an important skill that engineers and scientific professionals use throughout their careers, from collaborating with others to securing grant funds to sharing research findings. The judging portion at the Showcases gives students an opportunity to exhibit their professional skills in addition to giving a live demonstration of their prototype or model solution.

Similarly to the initial evaluation of the proposal packet, the assessments made day-of the Showcase will be in accordance with a weighted rubric. Demonstrations and interviews can garner up to 50 points derived from 5 categories worth up to 5 points each. The Showcase demonstration represents the remaining 50% of a team's total score.

Interview tips:

1. Review the rubric before beginning the interview.
2. Be prepared to re-word your questions if you find that a team or member is struggling to understand or answer. It is important to be mindful if the team or any of its members speak another primary language and English is their second.
3. Try not to ask questions that allow the teams to answer with a yes or no, and encourage students to elaborate on their answers.
4. The student may be nervous; a Showcase can be a stressful event. Asking them questions about their prototype can help to put them at ease.
5. Judges need to talk to students, not adults. Occasionally enthusiastic team supporters such as teachers or parents may want to answer a Judge's questions. In this case, a Judge should politely remind the adult that Judges are there to talk with the students and input from adults will not be considered.
6. Try to include as many student team members in your interview as possible
7. Being a Judge gives you a unique opportunity to impact students. They will be looking to you for positive reinforcement. Just a few words of encouragement can make their day. Try to leave each team with a positive feeling about their performance at the event.



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Showcase Demonstration and Interview Scoresheet

Judge & Company Name: _____ Date: _____

School Name: _____ Team Name: _____

Criteria for Evaluation	5	4	3	2	1	0
<p>Demonstration:</p> <ul style="list-style-type: none"> Effectively integrates problem solution into prototype Demonstration goes well with few glitches or flaws Safety and attention to detail, implemented both in physical prototype and demonstration process 						
<p>Innovation:</p> <ul style="list-style-type: none"> Novelty: ingenious/fresh engineering design Students understand and explain innovative feature (not just innovation for the sake of innovation) Efficient use of mechanical/electrical components (if applicable) Intentional use of materials including renewability 						
<p>Build (interpret as appropriate for computational models):</p> <ul style="list-style-type: none"> Soundly crafted; solid and robust mechanical design Subsystems cleanly integrated, thought out, and purposeful Critical thought demonstrated in autonomy (if applicable) Reliability, holds up under challenges Reliability: can produce consistent results each cycle Programming (if applicable): 						



<ul style="list-style-type: none"> <input type="radio"/> Clear writing, well-documented, easy-to-understand <input type="radio"/> Clear programming strategy <input type="radio"/> Programming management process (version history) 						
<p>Creativity:</p> <ul style="list-style-type: none"> • Ambitious thinking outside the box • Unique thinking and design process/methodology • Addresses problem in new and novel way • Inventive use of materials and mechanical processes • Optimizes each team members' particular talents 						
<p>Interview:</p> <ul style="list-style-type: none"> • Professionalism: team members take turns speaking and maintain eye contact, audible tone, clarity • Teamwork: each team member understands all aspects of project regardless of role, explains how each team member contributed • Clarity: students easily and clearly discuss all aspects of project • Answers questions with confidence, accuracy, completeness, and appropriate language usage • Confident, direct, and animated delivery • Sincerity: spirit of friendly competition and cooperation, respectful and courteous to event staff and other teams, demonstrated excitement and enthusiasm 						
Total:						



RESOURCES

SAMPLE INTERVIEW QUESTIONS:

1. What was the inspiration for your idea?
2. How did you agree on an approach to the project?
3. Can you walk me through the design/engineering/experimental process?
4. How did your background research influence your design process?
5. What makes your design different from previous solutions to the same problem?
6. How did you decide which team members would work on which parts?
7. What were some different perspectives or insights different team members had?
8. What were your main goals during this project?
9. How would you evaluate where you are in respect to those goals?
10. How did you measure the accuracy and validity of your prototype's effectiveness?
11. What are positive/negative effects of implementing this technology on a large scale?
12. What was the biggest challenge faced during this project? How did you overcome it?
13. What was the most fun/most exciting/most surprising part of this project?
14. What would you do differently if you started again from the beginning?
15. What would be the next step to improve the design?
16. What are future possibilities/implications of this design?



OFFICIAL STEM CHALLENGE RULES

1. The New Mexico Governor's STEM Challenge is open to eligible 9th, 10th, 11th, and 12th graders, who are enrolled in a public, private, parochial, or home school environment. If you are uncertain if your organization is eligible to participate, please contact a STEM Challenge program coordinator. These coordinators have the sole and exclusive authority to determine organizational eligibility to participate and have the right to require additional documentation to verify eligibility.
2. Student teams members must be from the same school or organization, except in the case of homeschoolers joining a public school team. Students cannot be on multiple teams in the same competition season.
3. Schools may register one (1) team per year.
4. As many students may work on a project as you wish, but only ten (10) students can represent your educational institution by submitting their team's proposal packet and presenting at the Statewide Showcase (hereafter referred to as "Showcase"). In addition, up to two educator mentors are recognized as part of the official team but may not participate in the Showcase demonstration or answer questions from the Judges.
5. The team members that present at the Showcase must be the same team members that submitted the original proposal packet. At the time for registering your team for the Showcase, you may select one student who can act as an alternate for the Showcase. The alternate can only be used if one of the original team members cannot attend due to illness or family emergency.
6. The deliverable deadline for the proposal packet is **November 22**. Failure to meet this deadline will result in point deduction.
7. Judges evaluate each deliverable in accordance with the rubrics. All decisions and scores a Judge assigns are final. Teams will not receive raw score sheets or be able to review scores from individual Judges.
8. Actions or comments from any team members or any team supporter that maligns, disparages, or harasses other team members, event coordinators, program staff, or volunteers; or damages, tampers with, or sabotages another teams' prototype will result in immediate disqualification.
9. If a dispute or disagreement occurs at the Showcase, an official team mentor may bring the matter to the attention of the STEM Challenge program coordinators, who will thereafter investigate and make a determination regarding the complaint. All decisions made by the program coordinators are final and not subject to appeal.
10. For the Showcase: all participants are solely and exclusively responsible for health insurance coverage. The NM Governor's STEM Challenge provides no coverage prior to, during, or following any Showcase event and assumed no responsibility or liability in connection with the provision of any health insurance coverage.
11. All Judges will be vetted and required to disclose potential conflicts of interest, including direct involvement or mentoring during that same year.
12. The NM Governor's STEM Challenge is an educational program established to encourage high school students to consider and explore careers in science, technology, engineering, and math. All STEM Challenge participants and their supporters acknowledge that participation in the STEM Challenge is not a right. By participating in the STEM Challenge, team members and team supporters agree and are bound to behave with respect and dignity for their team and for their fellow participants.
13. The NM Governor's STEM Challenge reserves the sole and exclusive right to amend these rules at any time.



OFFICIAL STEM CHALLENGE SPONSORS:



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