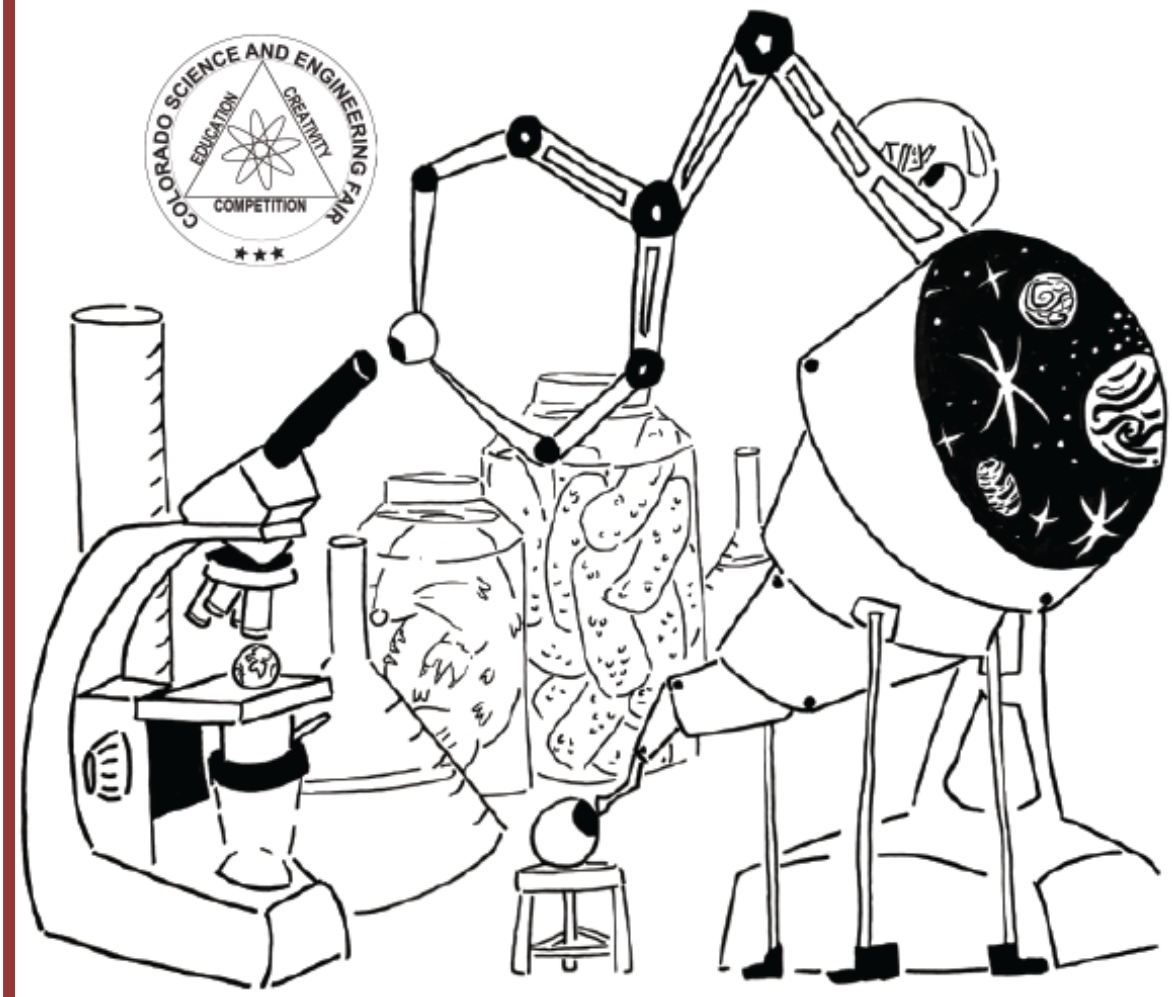
Colorado Science and Engineering Fair

Hosted by the Natural Sciences Education & Outreach Center
for Colorado students in grades 6 - 12



at Colorado State University - Fort Collins
April 11 - 13, 2024

FINALIST HANDBOOK

Copy and distribute freely!

Revised January 2024

Electronic version can be found at:
https://csef.natsci.colostate.edu/students

Natural Sciences Education and Outreach Center

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Dear Regional Science & Engineering Fair Winner:

Congratulations! Your outstanding science, technology, engineering or mathematics research project has earned you the right to represent your region and your school at the 69th Annual Colorado Science & Engineering Fair (CSEF)! This year's state science and engineering fair will be held on the Colorado State University, Fort Collins campus. Judging interviews will take place on Thursday, April 11th and include both grand awards and special awards. On Friday, April 12th, we will have a Guest Speaker and campus lab tours. ***Please note that due to issues finding a location to hold the CSEF awards ceremony, we are moving it to Saturday morning beginning at 9 a.m.*** This means that there will not be a public viewing or pizza party on Saturday and projects will need to be picked up on Friday, April 12th by 6 p.m.

In this handbook, you will find the necessary information needed to prepare for and participate in the CSEF: instructions for student registrations, CSEF and International Science & Engineering Fair (ISEF) form requirements, preliminary CSEF schedule of events, and much more.

At the CSEF, you will be one of approximately 300 of Colorado's top young scientists, and we want your state science and engineering fair experience to be the best we can make it. For this reason, we ask that you **read all of the information in this packet completely and carefully** because it will help make your experience easier and more enjoyable.

Finalists and their parents/guardian MUST submit a signed CSEF Finalist Permission/Verification Form that outlines all of the requirements for participating in this year's CSEF.

Because COVID-19, RSV and flu cases have been high this year, we ask that you stay home if you are feeling ill. **NOTE: Masks are NOT required in CSU buildings or vehicles at this time – however, some people may choose to wear them in various situations, and all attendees should respect each other's decisions in this regard.**

Your entire science and engineering fair experience is not only about hard work, dedication, and competition, but also comraderie, creativity, and education. We encourage you to take advantage of being with other like-minded next generation leaders and scientists and learn from each other.

We are going to hold a special presentation on Friday, April 12th to propose a new CSEF Junior Board idea that we would like to impliment in the next year. This will be open to all students, teachers and parents who may be interested in learning about how CSEF Finalists can take a leadership roll now in the CSEF organization.

Please remember that we are here for you. If you have any questions, please do not hesitate to contact me (**csef@colostate.edu**).

Sincerely,

Courtney Butler

Courtney Butler
Executive Director, CSEF

69th Annual Colorado Science and Engineering Fair

Colorado State University Lory Student Center – 3rd Floor

Thursday, April 11, 2024

Finalist Schedule

There will be NO on-site SRC interviews or paperwork fixes.
If SRC issues are not dealt with by April 1st, then the student will not be allowed to participate in the CSEF.

9:00 a.m. – 11:30 a.m.	Staggered Junior and Senior Division Finalist Check-In (your region's check-in time will be emailed to you)	Grand Ballroom Foyer

Finalists MUST stay with their exhibit until Display & Safety Inspection has been done and an Official Photo has been taken. Finalists must be out of the exhibit areas by 12:00 noon.

9:00 a.m. – 11:30 a.m.	Tour Ticket Pick-Up Pre-ordering of tickets is highly encouraged!	Room 322
12:45 p.m. – 5:00 p.m.	Judging Interviews – ***Students must be at their exhibits.***	Grand Ballroom

Adult Schedule

1:00 p.m. – 2:00 p.m.	CSEF Scientific Review Committee Debrief & Discussion	Room 322
2:30 p.m. – 4:30 p.m.	Professional Development – TBD	Room 322

Judging Schedule

9:45 a.m.	Grand Awards Judge Captains' Orientation	LSC Theater
11:00 a.m.	Grand Awards Judges' Orientation	LSC Theater
11:45 a.m.	Grand Awards Judges' Luncheon	LSC Theater Lobby
12:45 p.m. – 4:30 p.m.	Grand Award Judging Interviews	Grand Ballroom
1:15 p.m. – 5:00 p.m.	Special Award Judging Interviews	Grand Ballroom
5:15 p.m.	Exhibit area is locked. Best-of-CSEF judging begins. ***Only Judging Captains and SRC Members are permitted in the exhibit area at this time.***	

Friday, April 12, 2024

9:00 a.m. – 5:00 p.m.	CSEF Finalist Exhibits Open to the Public and the Media	Grand Ballroom
9:00 a.m. – 10:30 a.m.	Guest Speaker – TBA	LSC Theater
11:00 a.m. – 4:00 p.m.	Tours & Presentations – *Registration is required.*	
4:00 p.m.	Finalist Ballots for Student Choice and Poster Contest are due.	Registration Booth
5:00 p.m. - 6:00 p.m.	Project Teardown – all projects must be removed by 6 p.m. *Project not picked up by this time will be stored in Room 322 until 1:00 p.m. on Saturday, April 13th.*	Grand Ballroom

Saturday, April 13, 2024

9:00 a.m. – 12:00 p.m.	Awards Ceremony	Timberline Church
8:00 a.m. – 1:00 p.m.	Project Pick-up	Room 322

CSEF Board of Directors meeting will be held via Zoom on Saturday, April 20th.

CSEF Registration Deadlines

CSEF Finalists need to complete the registration process as outlined on page 5 by the deadline listed below for their Regional Science Fair. Failure to register by the deadline listed below for your regional science fair may forfeit your spot in this year's Colorado Science & Engineering Fair competition.

Check with your Regional Fair Director to get instructions and deadlines for submitting the ISEF or CSEF Middle School forms and the Finalist Permission/Verification form to them.

ALL CSEF Finalists MUST also submit their abstracts online as directed in the instructions on page 5. Failure to do so will compromise your project's pre-review by the judging captains.

Arkansas Valley Regional Science Fair
Held February 9 & 10, 2024
Registration Deadline: ***February 17, 2024***
Brian Beyerl & Warren McClure – RSF Directors
otero-science-fair@otero.edu

Boulder Valley Regional Science Fair
Held February 20 & 26, 2024
Registration Deadline: ***March 4, 2024***
Cameo DeDominces – RSF Director
bvsdsciencefair@bvsd.org

Denver Metro Regional Science Fair
Held February 23 & 25, 2024
Registration Deadline: ***March 3, 2024***
Erin Golden, Samantha Sands & Kayla Ahr – RSF Directors
denversciencefair@ucdenver.edu

East Central Regional Science Fair
Held February 21, 2024
Registration Deadline: ***February 28, 2024***
Will Mallory & Ellen Emmerling – RSF Directors
wmallory@genoahugo.org

Longs Peak Regional Science Fair
Held February 15, 2024
Registration Deadline: ***February 22, 2024***
Victoria Duncan – RSF Director
victoria.duncan@unco.edu

Morgan/Washington Regional Science Fair
Held February 26 & 27, 2024
Registration Deadline: ***March 4, 2024***
Darline Miner – RSF Director
d.miner2@brushschools.org

Northeast Regional Science Fair
Held February 29, 2024
Registration Deadline: ***March 4, 2024***
Sonya Shaw – RSF Director
shaw1@plainstel.com

Pikes Peak Regional Science Fair
Held February 24 & 27, 2024
Registration Deadline: ***March 4, 2024***
Nancy Hampson & Carol Bach – RSF Directors
pprsf.colorado@gmail.com

San Juan Basin Regional Science Fair
Held February 20, 2024
Registration Deadline: ***February 27, 2024***
Lucy Powers – RSF Director
lucy@powsci.org

San Luis Valley Regional Science Fair
Held March 1, 2024
Registration Deadline: ***March 4, 2024***
Lucy Adams – RSF Director
laadams@adams.edu

Southeast Regional Science Fair
Held February 28, 2024
Registration Deadline: ***March 4, 2024***
Terri Lira – RSF Director
terri.lira@lamarschools.org

Southern Colorado Regional Science Fair
Held February 26 – 29, 2024
Registration Deadline: ***March 4, 2024***
Mary Jose – RSF Director
mary.jose@pueblocityschools.us

Western Colorado Regional Science Fair
Held February 23, 2024
Registration Deadline: ***March 1, 2024***
Kevin Hoskin – RSF Director
kevin.hoskin@d51schools.org

2024 CSEF Online Registration Instructions

All CSEF Finalists are required to register online at **https://csef.natsci.colostate.edu/students/**. CSEF Finalists should complete their registration form immediately after being chosen by their Regional Science Fair. Failure to register by the regional science fair registration deadline listed on page 4 may forfeit your spot in the CSEF. Complete the following steps IN ORDER for a successful registration process:

1. Enter all information completely on the registration web form, and pay close attention to required fields as the form will not submit if these are not entered properly.
2. Once you have completed the Registration Form (**http://tinyurl.com/2024CSEFRegistration**), click the blue SUBMIT button at the bottom of the page. An email will be sent to the address given for the student – **you MUST verify that address in order for the form to be submitted and your registration to be complete. Do this ASAP!** Corrections can be emailed to the CSEF Director - DO NOT resubmit a new form!! If you experience technical difficulties with the registration process, contact the CSEF Executive Director at **courtney.butler@colostate.edu** or 970-491-7716 immediately.
3. You must also print the Finalist Permission/Verification Form found on page 6 of this Handbook or on the CSEF website at **http://tinyurl.com/CSEF2024Student**.
4. Sign the Finalist Permission/Verification Form and have your Parent/Guardian read and sign it as well. This form will need to be submitted to the CSEF via your Regional Fair Director.
5. Type your abstract into the appropriate webform. Click the blue SUBMIT button at the bottom of the page. An email will be sent to the address entered - **you MUST verify that address in order for the form to be submitted and your abstract to be complete**.
   Individual Projects (**http://tinyurl.com/2024IndividualAbstract**)
   Team Projects (**http://tinyurl.com/2024TeamAbstract**)
   Abstracts must be submitted by March 4th in order for them to be pre-reviewed by the judging captains.
8. Print **TWO** copies of your abstract and sign them both. One copy is to be submitted to the CSEF via your Regional Fair Director. The other copy is to be in your notebook during CSEF.
9. Turn in the following forms to your Regional Fair Director along with the $40/STUDENT registration fee:
   - 2024 Finalist Permission/Verification Form
   - 2024 CSEF Abstract Form (either Individual or Team)
   - Checklist for Adult Sponsor Form 1 (copy ONLY)
   - Student Checklist Form 1A (copy ONLY)
   - Research Plan (copy ONLY)
   - Approval Form 1B (copy ONLY)
   - All other ISEF/CSEF forms required for your type of project (copies ONLY)

Tips for completing the registration form:

- All items marked with a red * are REQUIRED – the form will not submit unless you fill out all of these fields.
- Use the **TAB** key to move between fields. **DO NOT USE THE ENTER** key as this will try to submit the form prematurely.
- Register a ***Non-School*** email address in order to avoid issues with school/district security settings. Use a parent's email if you don't have your own personal email address.
- **Remember you will have to verify your registered email address in order for the registration and abstract forms to be submitted, so check your email immediately after you click "Submit".**
- The Adult Sponsor entered MUST be the person who signed the Checklist for Adult Sponsor Form 1, NOT the person attending CSEF with you.
- Project Titles are limited to **90 CHARACTERS ONLY!** The database will not accept anything past the 90 character limit.
- The portion at the end of the Project Information section is for **Team Leaders ONLY!!!**
- The information under Project Type ***MUST*** match what is submitted on the Checklist for Adult Sponsor Form 1.

Colorado Science & Engineering Fair (CSEF)
2024 Finalist Permission/Verification Form

(one form per student)

FINALIST'S NAME:_____

PROJECT DOCUMENTATION & PAYMENT: The following must be returned **ASAP** to your Regional Fair Director (RFD) in order to consider your registration complete and ready for Scientific Review Committee (SRC) review.

- **COMPLETED** and signed Finalist Verification Form (one per student).
- **COMPLETED**, signed and dated CSEF Abstract Form (one per project).
- **COMPLETED**, signed and dated copies of these ISEF or CSEF forms: Checklist for Adult Sponsors Form (1), Student Checklist Form (1A), Research Plan, and Approval Form (1B).
- **COMPLETED**, signed and dated copies of other ISEF or CSEF forms required for the type of project.

REGISTRATION FEE PAYMENT: Registration fees are $40/STUDENT and due by April 1st. Checks should be made out to CSEF and sent to P O Box 1465; Fort Collins, CO 80522-1465 or pay via Venmo to Courtney-Butler-114.

FINALIST'S AGREEMENT WITH THE COLORADO SCIENCE & ENGINEERING FAIR:

I, the above named Finalist, understand that by registering online with the CSEF and submitting this form to my Regional Fair Director, I am making a commitment to present my project at this year's CSEF, April 11 - 13, 2024 and agree to the following:

- My project will remain set up from 12 noon on Thursday, April 11th until 5 p.m. on Friday, April 12th.
- My digital project materials will be submitted by March 27th and will remain available through the CSEF website to the judges and the public through at least May 31st.
- I will be present at my project from 12:45 p.m. - 5 p.m. on Thursday, April 11th for judging interviews.
- I will be present at the Awards Ceremony on Saturday, April 13th *or I will appoint someone to accept any awards I may win on my behalf.*
- I will allow CSEF to use any photos/video taken of me and/or my project in CSEF publications and on the CSEF website for promotions and the media.
- The CSEF uses the following definition of plagiarism from Merriam-Webster.com "the act of using another person's words or ideas without giving credit to that person". I attest that my project is free of plagiarism.

I understand that if I do not honor this agreement (without previous arrangement with my Reginal Fair Director and the CSEF Director) I may be disqualified from the competition. If I am unable to participate in the Colorado Science & Engineering Fair, I will notify my Regional Fair Director immediately.

Finalist's Signature:_____Date:_____

PARENTAL PERMISSION:

As the parent or legal guardian of the above named Finalist, I am granting permission for my student to participate in the CSEF, April 11 – 13, 2024 and agree to the following:

- CSEF may use any photos/video taken of my student and/or their project in CSEF publications and on the CSEF website for promotions and the media.
- My student is allowed to sign up for and participate in the tour and presentation activities offered by the CSEF on Friday, April 12th.
- Any student needing special scheduling accommodations will need to submit a waiver form to the CSEF Director by March 31st. Please contact the director at csef@colostate.edu to get a copy of the form.
- In consideration of the Colorado State Science Fair (CSSF), Inc. and Colorado State University permitting the above named student to take part in the Colorado Science and Engineering Fair, I, the undersigned, waive all claims against CSSF, Inc. and all sponsors for injury to or death of persons or loss or damage of property in any way occurring in connection with the CSEF, and I, the undersigned, agree to indemnify and hold CSSF, Inc. and Colorado State University harmless against all such liability.

Parent/Guardian's Signature:_____Date:_____

2024 CSEF Digital Project Material Requirements

Digital Project Materials are required in order to aid in the judge's review (both Grand and Special) process, giving them more time to become familiar with your project prior to the interviews taking place on April 11th. ***All digital project materials MUST be uploaded to the CSEF Symposium site by March 27th*** **https://symposium.foragerone.com/2024-csef/submission**.

Required Project Materials:

Project Presentation – this must be in PDF format and submitted to the CSEF Symposium site under Presentation Media (instructions can be found on page 23).

Signed CSEF Project Abstract – this must be submitted via the web form by your Regional Science Fair's personalized deadline (see page 4) even though you will be able to enter the same information to Symposium under Abstract or Description – we require you to sign the ethics statement on the official CSEF Abstract Form. Please print 2 copies - one to give to your Regional Fair Director and one for your notebook.

Individual Project Abstracts: **http://tinyurl.com/2024IndividualAbstract**

Team Project Abstracts: **http://tinyurl.com/2024TeamAbstract**

Optional Project Materials:

Project Video – this must be a URL link to an unlisted YouTube video and submitted to the CSEF Symposium site under Presentation Media (instructions can be found on page 24).

Project Demonstration/Simulation/Animation Video – this must be a URL link to an unlisted YouTube video and submitted to the CSEF Symposium site under Optional: Demo Video (instructions can be found on page 24).

Research Paper – this is a PDF document of your formal research paper being submitted for the Technical Writing Award and must be emailed to **csef@colostate.edu** by March 22nd (details can be found on page 19). You can also submit this to the CSEF Symposium site as an external link (Google Drive, etc.) under Optional Supplementary Materials.

Statistical Award Sample – this is a PDF document of your sample graph or table and description being submitted for the David Young Award for the Best Use of Statistics and must be emailed to **csef@colostate.edu** by March 22nd (details can be found on page 20). You can also submit it to the CSEF Symposium site as an external link (Google Drive, etc.) under Optional Supplementary Materials.

Quad Chart – this is a 1-page summary of your project that will be required for ISEF, but is optional for CSEF and can be submitted to the CSEF Symposium site as an external link (Google Drive, etc.) under Optional: Supplementary Materials (instructions can be found on page 25).

Please be aware that once you have uploaded your materials, you will not be able to edit or remove these without the help of the CSEF Team, so please *submit only once you are confident in all of your presentation material!*

Submission Link: https://symposium.foragerone.com/2024-csef/submission

Registration and CSEF/ISEF Forms

REMEMBER!
CSEF will keep all the copies of your forms that you submit to your Regional Fair Director.
Keep **ORIGINALS** in your Research Notebook at all times.
NEVER send original forms, send only **COPIES!**

Forms Required for ALL Projects					
2023 Finalist Permission/ Verification Form	Signed CSEF Abstract Form	Checklist for Adult Sponsor (1)	Student Checklist (1A)	Research Plan	Approval Form (1B)

NOTE: #1 through #5 are forms that are required for ALL projects:

1. **2024 Finalist Permission/Verification Form** (**http://tinyurl.com/CSEF2024Student)** contains permissions and acknowledgements for participating in the 2024 CSEF. *After submitting the registration information online, print the verification form (page 6 of this booklet), obtain the appropriate signatures and submit it along with the other required forms to your Regional Fair Director immediately.* Your Regional Fair Director must return it to CSEF by his/her individual deadline. Each member of a team must register and pay separately – even though all team member names appear on the team leader's registration form. *If your school district or some other organization does not pay the $40 entry fee, you must enclose a check with your Finalist Verification Form.* **Registration fees are due to CSEF by April 1st!**

   Tips for completing the 2024 Online Registration Form:
   - We MUST have a home mailing address of the student in order to send special awards out after the CSEF.
   - Due to issues with security settings on school servers, please include a NON-SCHOOL email address for the Finalist.
   - You must provide a **VALID** email address for your Adult Sponsor so they may receive your Scientific Review Committee (SRC) report information.
   - You must read and sign the Finalist Permission/Verification Form. If you have any difficulties with these conditions, please contact Courtney Butler, the CSEF Director, at (970) 491-7716 immediately. Finalists who fail to follow the agreement, without contacting CSEF, may forfeit any awards won.

2. The **CSEF Abstract** (printed from the CSEF web form) is one of the most critical forms used by the CSEF Judges. The **ORIGINAL** of this signed form should be included in your Research Notebook. *Send a signed COPY to your Regional Fair Director to be submitted to CSEF with your Finalist Permission/Verification Form.* Teams should prepare one abstract form with the signatures of all team members. The abstract should be no more than 250 words and should include the purpose of the experiment, a summary of the procedures used, data gathered, and conclusions reached. A COPY of this abstract may also be on your display board and in your Digital Project Materials. (See page 16 for sample abstracts. The abstract is **not** a repeat of your research plan!)

Registration and CSEF/ISEF Forms

3. **Checklist for Adult Sponsor (1)** is required for ALL projects and is used by CSEF SRC to determine if your project is eligible for competition at the state science fair level. This form does NOT need to be included in your Research Notebook at the CSEF.
4. **Student Checklist (1A)** is required for ALL projects and is used by the CSEF SRC to determine if your project is eligible for competition at the state science fair level. This form does NOT need to be included in your Research Notebook at the CSEF.

   Notes about the Student Checklist (1A):
   - The Project Start Date should be the date that LABORATORY/EXPERIMENTAL work began, not when library/internet research began. Also, all projects must have a Project End date that is prior to CSEF for competition purposes.
   - Include complete names and physical addresses for all work sites. Work done at a residence should be noted as such (i.e.: Jones' residence). P O Boxes are NOT work sites!
   - Attach a **completed and typed** Research Plan that includes your works sited. Be sure to include all information about your experimental design that is relevant.
5. **Approval Form (1B)** is required for ALL projects and is used by the SRC to determine if your project is eligible for competition at the state science fair level. Members of Team Projects must have one Approval Form (1B) per student. These forms do NOT need to be included in your Research Notebook at the CSEF.

   Notes about the Approval Form (1B):
   - The student and parent MUST both approve this project BEFORE experimentation, so signatures must be obtained BEFORE the experiment's start date on Form 1A.
   - Please note that the CSEF SRC Chairperson will sign the last line of this form and a copy will be returned to you for your records (if needed for future competitions).
6. **Other Possible Required Forms** (see Checklist for Adult Sponsor for details) are used by the SRC to determine if your project is eligible for competition at the state science fair level.
   - ***Research Institution/Industrial Setting Form (1C)** is to be completed AFTER the experimental work is completed.
   - Qualified Scientist Form (2) is required for some types of projects.
   - Risk Assessment Form (3) is required for all projects using the CSEF Middle School forms.
   - Human Participants Form (4) is required for all projects using human subjects and must be reviewed and approved by an IRB prior to experimentation.
   - Human Subject Informed Consent is required at the discretion of the IRB reviewing the project. The signed copies of these forms MUST NOT be included in your Research Notebook at the CSEF.
   - Vertebrate Animal Form (5A or 5B) is required for all projects using vertebrate animals.
   - Potentially Hazardous Biological Agents Risk Assessment Form (6A) is required for microbiology, rDNA and tissue projects.
   - Human & Vertebrate Animal Tissue Form (6B) is required for all projects involving tissue.
   - ***Continuation/Progression of Projects Form (7)** is required for projects that are a continuation or progression of past research.

***If applicable to your project, these forms SHOULD be included in your Research Notebook at the CSEF for the judges to review. No other form needs to be included in your Research Notebook during the CSEF.**

CSEF SCHEDULE NOTES – **PLEASE READ!!**

Updates to this information can be found on the CSEF website: **https://csef.natsci.colostate.edu/students/**

Monday, March 4 – Monday, March 11, 2024

The CSEF Category Judging Captains for each division will review the submitted abstracts to make sure students are entered into the correct category. If it is determined that a change is recommended, the student and adult sponsor will be contacted for approval.

Friday, March 22, 2024

The CSEF Scientific Review Committee will be meeting via Zoom in order to finalize the determination status of all projects entered into the CSEF. All projects will fall into one of these categories:

- *Approved for Competition* – no further action is needed and students will be allowed to participate in the 2024 CSEF
- *Form Corrections Needed* – there are pieces of the paperwork that need to be explained or fixed before the students will be allowed to participate in the 2024 CSEF
- *Research Plan Questions* – there are questions regarding the students' research plan that must be answered before they will be allowed to participate in the 2024 CSEF
- *Safety/Supervision Concerns* – there are questions/concerns about the risks involved in the project and who supervised the student that need to be addressed before the students will be allowed to participate in the 2024 CSEF
- *Interview Needed* – the SRC feels that they need to speak with the student and adult sponsor in order to clear up any concerns regarding the research before they will be allowed to participate in the 2024 CSEF
- *Fail to Qualify* – if a project is found to be in serious violation of the rules for pre-college science research, then it will fail to qualify for competition and the students will not be allowed to participate in the 2024 CSEF

Corrections to paperwork will be due to CSEF by April 5th in order to compete in the 2024 CSEF. Absolutely NO SRC interviews or paperwork corrections will be done on site!

Tuesday, March 26 & Wednesday, March 27, 2024

Interviews with the CSEF Scientific Review Committee will be scheduled via Zoom on these 2 days as needed based on the SRC reviews conducted on March 22nd. Students will be notified via email of the need for an interview.

Wednesday, March 6 – Wednesday, March 27, 2024

ALL digital project materials (see pages 7 & 23-25 for details) must be submitted to Symposium (**https://symposium.foragerone.com/2024-csef/submission**) by Wednesday, March 27th for Display & Safety Inspections (see page 14) to be completed.

Sunday, March 31, 2024

Judges will be able to begin pre-reviewing digital project materials in order to prepare for the student interviews on April 11th. Grand Award judges will be required to review both the official abstract and the project presentation to formulate questions they want to ask during the interviews. While the other project materials will be available to judges, they may or may not choose to view them. Special Award judges will view any and all project materials at their discretion in order to narrow their choice of projects to interview.

CSEF SCHEDULE NOTES – **PLEASE READ!!**

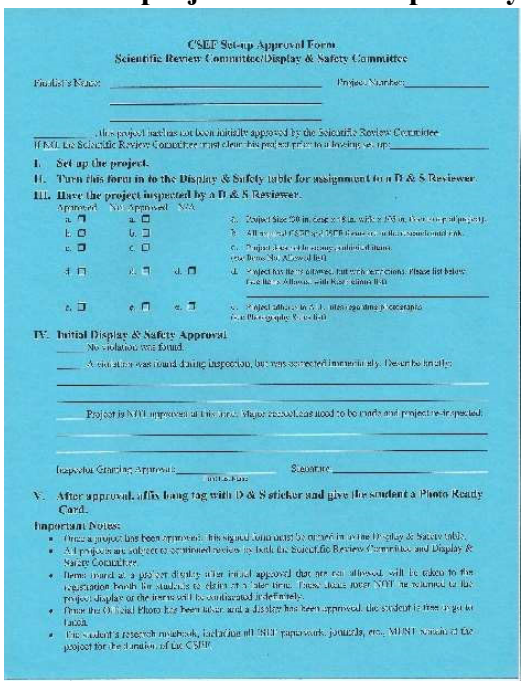
Thursday, April 11, 2024

On **Thursday, April 11, 2024**, activities include setting up projects, display & safety inspections, official photos and judging interviews by Grand Award and Special Award Judges.

- **Registration Packets.** Students should plan on reporting to the designated area outside the Grand Ballroom of the Lory Student Center (LSC) at the assigned time to pick up their registration packet and CSEF t-shirt. *Please be sure to wear your nametag at all times during the CSEF, especially during judging, the Awards Ceremony and while on tours.*

- **Pre-ordered Tickets for Friday's Tours and Presentations.** Pre-registration for the tours/presentations will begin on March 11th using the CSEF Tour Registration webform and done on a first-come, first-served basis. A tentative list of tours and presentations can be found on page 17 of this Finalist Handbook. On-site tour registrations will be limited – make sure to pre-order your tickets!

- **Display Set-up.** All projects will be set-up in the Grand Ballroom on the 3rd floor of the LSC, but this may change the closer we get to the CSEF. **All projects must be in place by 12 noon**.



CSEF Set-up Approval Form
Scientific Review Committee/Display & Safety Committee

Finalist's Name: _____ Project Number: _____

_____

_____

_____ This project has not been initially approved by the Scientific Review Committee
HOLD for Scientific Review Committee and clear this project prior to set-up: _____

I. Set up the project.
II. Turn this form in to the Display & Safety table for assignment to a D & S Reviewer.
III. Have the project inspected by a D & S Reviewer.

Approved Not Approved N/A

a. ☐ a. ☐
b. ☐ b. ☐
c. ☐ c. ☐
d. ☐ d. ☐
e. ☐ e. ☐ e. ☐

IV. Initial Display & Safety Approval
_____ No violations were found.
_____ A violation was found during inspection, but was corrected immediately. Do not re-inspect.
_____
_____
_____ Project is NOT approved at this time. Major research has need to be made and project re-inspected.
_____
_____
_____
Inspector Granting Approval: _____ Signature: _____
Initials Date

V. After approval, affix hang tag with D & S sticker and give the student a Photo Ready Card.

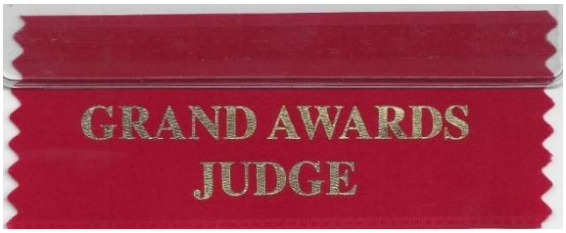
Important Notes:
- Once a project has been approved, this signed form must be returned to the Display & Safety table.
- All projects are subject to continued review by both the Scientific Review Committee and Display & Safety Committee.
- Items found at a judges' table after initial approval that are not allowed will be taken to the registration booth for students to claim at a later time. Those items NOT authorized for the project display or the interview will be confiscated indefinitely.
- Once the Official Photo Tag has been affixed and a display has been approved, the student is free to go to lunch.
- Do not add a research notebook, including all SRC paperwork, journals, etc., YOU MUST remain with the project for the duration of the CSEF.

- **Display & Safety Inspections.** When you have completed your display set-up, report to the Display & Safety station with the blue Setup Approval Form for assignment to Display & Safety Inspector. You should then return to your project and remain there until the Display & Safety Inspector has checked the project for compliance with the CSEF Display & Safety Rules (*see page 14 for details*). Please note that inspections will be conducted throughout the CSEF and if items are found that were missed by the first inspector, they will be confiscated and a note will be left on what was taken and how to reclaim it on Saturday.

- **Official Photos.** Once the project has been cleared by a Display & Safety Inspector, they will place a sticker on the hang tag and you will receive a yellow Photo-Ready Card that you will need to fill out and turn in at the Photography Station to be assigned a photographer. Return to your project and wait for an official photographer to take your picture and place another sticker on your hang tag. **Only after both stickers have been placed on your project hang tag are you free to go to lunch.**

Thursday, April 11, 2024 continued

- **Judging.** You must be at your project from 12:45 p.m. – 5:00 p.m. for judging interviews.
  - **Grand Awards Judging.** All finalists should be interviewed by at least three Grand Award Judges by 3:00 p.m. During this first round of interviews, judges have been instructed to place stickers on the project hang tag of each student they interview, but they sometimes forget, so you may politely remind them if necessary. If you feel that you have not been judged by the required number of **Grand Award Judges** by 3:30 p.m., please report this to a CSEF Volunteer immediately. ***Informing us of a problem on Friday would be too late for us to do anything about it.***



  - **Special Award Judging.** Various organizations have sent representatives to act as Special Award Judges and select projects to receive awards based on criteria relevant to that organization. This means that you will more than likely **not** be interviewed by the same number of Special Award Judges as your neighbors.

  - **Business Cards and Abstracts.** It is **not** appropriate or allowable for finalists to hand out business cards, abstracts or anything else that promotes the project to judges during the judging session. Please note that judges have access to your abstract via Symposium.

  - **Student Advocates.** There will be several individuals roaming the exhibit hall checking in with all of the students. They are there to assist you should you need help or are concerned about an interaction with a judge.

  - **Dismissal.** Students will be released by a CSEF official once we have word from the Grand Awards and the Special Awards Coordinators that the judges are through with interviews.

- **Best-of-CSEF Judging.** The judging captains from each of the categories will be reviewing all of the 1st place projects to determine the top projects in both divisions – so DO NOT remove your display board. All other display items (equipment, models, notebooks, etc.) can and should be taken with you when you leave on Thursday.

Friday, April 12, 2024

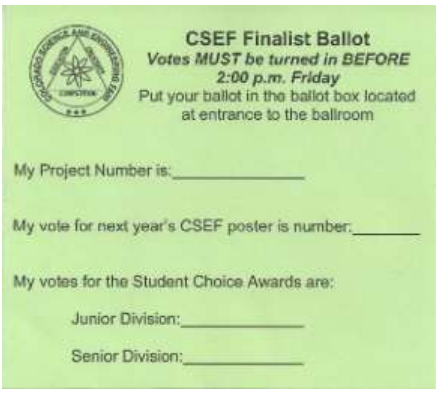
On **Friday, April 12, 2024** activities will include a guest key note speaker, a series of tours and scientific presentations for the finalists, their teachers and accompanying adults, the awards ceremony, and public viewing (students do not need to be present at their projects).

- **Tours.** For those taking tours of various CSU labs or attending presentations by local scientists – tour guides will be available to lead groups from the LSC to the tour location. Tours will leave the LSC at the time indicated on the tour ticket – **DON'T BE LATE!!**
- **Guest Speaker.** The guest speaker for 2024 is yet to be determined. The talk will take place at 9:00 a.m. in the LSC Theater.

CSEF SCHEDULE NOTES – **PLEASE READ!!**

Friday, April 12, 2024 continued

- **Student Choice and Poster Art Awards.** You are encouraged to vote for your favorite Junior and Senior Division project and favorite poster art submission (located on the tack board in the foyer outside Grand Ballroom) for next year's publicity. Ballots can be found in your registration packet and are due to the registration booth by 4 p.m. on Friday.


CSEF Finalist Ballot
Votes MUST be turned in BEFORE 2:00 p.m. Friday
Put your ballot in the ballot box located at entrance to the ballroom

My Project Number is:_____

My vote for next year's CSEF poster is number:_____

My votes for the Student Choice Awards are:

Junior Division:_____

Senior Division:_____

- ***Project Teardown.** Due to needing to move the Awards Ceremony to Saturday morning, all projects need to be taken down and removed from the Grand Ballroom by 6:00 p.m. Any project left at 6:00 p.m. on Friday will be removed from the Grand Ballroom and stored in Room 322 of the Lory Student Center for pick up the next day.

Saturday, April 13, 2024

On **Saturday, April 13, 2024** we will hold the Awards Ceremony. All other normal Saturday activities will be cancelled. In future years, we may look to move the pizza party to Friday evening along with the door prizes.

- ***Awards Ceremony.** The awards ceremony will be held at Timberline Church in Fort Collins. The ceremony will begin promptly at 9:00 a.m. Due to the vast number of awards given out at this year's CSEF (over 500 individual awards), the ceremony may take up to 3 hours, so please plan accordingly. Official ceremony photos will be taken of the winners, so please dress nicely for this event. Any unclaimed awards from Saturday morning will be mailed to the student.

- **Project Pick-Up.** Projects that were not taken on Friday evening will be available in Room 322 of the Lory Student Center until 1:00 p.m.

- **CSEF Surveys.** Our online surveys will be available during and after the CSEF to collect constructive comments and feedback from both student Finalists and adults. Use the fliers in your registration packet to gain access to the different surveys.

CSEF Display & Safety Guidelines

Display & Safety Inspectors will be evaluating ALL project materials (digital & physical). Please review this list of restrictions, and plan your exhibit accordingly.

Physical Exhibit Size:

The dimensions of ALL project materials may not exceed 108" high, 48" wide and 30" deep and nothing can be set in front of the table.

Research Notebook:

These forms MUST be present at the project for judges to review:

- Signed CSEF Abstract form
- Research Plan

These forms MUST be present at the project for judges to review if applicable to the project:

- Research Institution/Industrial Setting Form 1C
- Continuation/Progression of Projects Form 7

Photographs/Images:

These rules apply to BOTH the digital and physical project displays.

ALL photos, visual images, charts, tables and graphs MUST be credited as to who took or created them. Also, photographs, images, charts, tables and/or graphs are allowed IF:

1. It is not deemed offensive or inappropriate (which include images/photos showing vertebrate animals/ humans in surgical, necrotizing or dissection situations) by the SRC, Display & Safety Committee or CSEF.
2. It is from the Internet, magazine, newspaper, journal, etc. and a credit line is attached. NOTE: background images must also be credited.
3. It is a photograph or visual depiction of the finalist.
4. It is a photograph or visual depiction of persons other than the finalist as long as there is a signed consent form available for review.

Items NOT Allowed to be Displayed within the Project:

These rules apply to BOTH the digital and physical project displays.

1. Any information that are self-promotions or external endorsements are not allowed in the project booth, including:
   a. Commercial logos, known brands, institutional crests or trademarks, and flags
   b. Any reference to an institution or mentor that supported the research except as provided in an acknowledgement section
   c. Any reference to patent status of the project
   d. Any items intended for distribution
2. Postal, web, email and/or social media addresses, QR codes, telephone and/or fax numbers of a finalist.
3. Active internet or email connections as part of the display or operating the project.
4. Prior year's written material or visual depictions on the vertical display board (exception: the project title may mention which year the project is in).

Items NOT Allowed at the physical Project Display:

1. **Living organisms** (including plants, animals, insects, etc.)
2. **Glass**
3. **Soil, sand, rock**, and/or waste samples, etc.
4. Taxidermy specimens or parts
5. Preserved vertebrate or invertebrate animals
6. Human or animal **food**
7. Human or animal **parts or body fluids**
8. **Plant materials** (living, dead or preserved) that are in their raw, unprocessed or non-manufactured state
9. All **chemicals** including **water** (projects may NOT use any liquid as part of a demonstration)
10. All hazardous substances or devices (poisons, drugs, **firearms, weapons, ammunition**, reloading devices, grease/oil, **lasers**, dry ice, etc.)
11. Items that may have contained or been in contact with any type of chemical
12. **Sharp items** (syringes, needles, pipettes, knives, etc.)
13. Flames or highly flammable materials (including magnified light sources)
14. Batteries with open-top or wet cells (regular store bought batteries that have not been altered are okay)
15. Lasers or **laser pointers**
16. **3-D printers** (unless power source is removed)
17. **Drones** (unless the propulsion power source is removed)
18. Any inadequately insulated apparatus producing extreme temperatures that may cause physical burns
19. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points
20. Any display items that are deemed distracting (sounds, lights, odors, etc.)

CSEF, the Display & Safety Committee, and/or the Scientific Review Committee reserve the right to remove any project for safety reasons or to protect the integrity of the CSEF and its rules and regulations.

CSEF Category Descriptions

The **Animal Sciences** category includes studies that relate to all aspects of animals (including insects) and animal life; animal life cycles; animal interactions with on another; or the thought processes and behaviors of animals and their interactions with the environment.

The Behavioral & Social Sciences category includes studies that relate to the thought processes and behaviors of humans in their interactions with the environment using observational and experimental methods.

The Biomedical & Health Sciences category includes studies that relate to human health, such as the diagnosis, treatment, prevention or epidemiology of diseases and other damage to the human body or mental systems as well as internal or external impacting factors (feedback mechanisms, stress, environment). It also includes studies that relate to the improvement of human health and longevity by translating novel discoveries in the biomedical sciences into effective activities and tools for clinical and public health use.

The Chemistry category includes studies that relate to the science of the composition, structure, properties and reactions of matter not involving biochemical systems. It also includes studies that relate to the integration of various material forms in systems, devices and components that rely on their unique and specific properties. This involves their synthesis and processing in the form of nanoparticles, nanofibers, and nanolayered structures or measurements of various properties and characteristics of the structure across length scales, in addition to multi-scale modeling and computations for process-structure and structure-property correlations.

The Earth & Environmental Sciences category includes studies that relate to Earth systems and their evolution along with the environment and its effect on organisms and/or systems.

The Energy category includes studies that relate to the production and/or storage of energy.

The Engineering category includes studies that relate to the science and engineering involving the movement and stability of structures. It also includes studies that relate to the use of machine intelligence to reduce the reliance on human intervention. It also includes studies that relate to electrical systems in which information is conveyed via signals and waveforms for purposes of enhancing communications, control and/or sensing.

The Environmental Engineering category includes studies that relate to the engineering or development of processes and infrastructure involved in solving environmental problems in the supply of water, the disposal of wastewater or the control of pollution.

The Mathematics & Computer Sciences category includes studies that relate to the measurement, properties and relationships of quantities and sets. Using numbers and symbols as well as the deductive study of numbers, geometry and various abstract constructs or structures. It also includes studies that relate to the discipline and techniques of computer science and mathematics as they relate to biological systems and those related to the development of software, information processes or methodologies to demonstrate, analyze or control a process or solution.

The Micro & Molecular Biology category includes studies that are related to micro-organisms, including bacteria, viruses, fungi, prokaryote, and simple eukaryotes as well as antimicrobial and antibiotic substances. It also includes studies related to the understanding of life and cellular processes at the molecular level, such as the structure, function, intracellular pathways and formation of cells.

The **Physics & Astronomy** category includes studies that relate to the science of matter and energy and the interactions between the two as well as the study of anything in the universe beyond the Earth.

The **Plant Sciences** category includes studies that relate to plants and how they live, including structure, physiology, development and classification.

Sample Abstracts

The abstract is one of the most important pieces to your project. This is what the Grand Award Judging Captains use to determine whether you are in the right category before you even arrive at the science fair. The Special Awards Judges use the abstracts as a way to filter out the Finalists they want to interview, based on the criteria of the awards they have to present. The following are two excellent examples of abstracts written by your peers.

A Novel Phosphosite Localization Approach Using Phosphoprotein Mass Spectra and Temporal Dilated Networks

Margaret Arthur, Grade 11 © 2023

Reason or Problem Statement

Dysregulation of protein phosphorylation during cellular development and signal transduction is associated with a myriad of human cancers. Understanding the exact amino acid binding sites is critical for medical and pharmacological applications but current experimental and computational methods are time-consuming or imprecise.

Methods Procedure and/or Approach

I developed a novel approach to identifying phosphosites using peptide tandem fragmentation mass spectra, which is more applicable for drug design compared to sequence input. I created a temporal convolutional neural network (TCN) to identify the exact phosphorylated amino acid from a given spectrum. I processed the mass spectra data to create a two-vector representation for efficient analysis. My model uses and unique architecture that promotes flexibility and interpretability with considerations for long-range associations between spectral peaks critical for phosphosite identification. I accounted for neutral losses, a common phenomenon in proteomics mass spectrometry, through the independent identification of unique spectral patterns. Instead of requiring existing input features that could increase bias or decrease the identification of rare or new phosphosites, my model identifies its own patterns.

Results Findings and/or Product

My model achieved an average accuracy of 95% compared to the accuracies (76-78%) of sequence-based models. Future work includes improving accuracies across all organisms, adapting the model for prokaryotes for an improved understanding of phosphorylation events, and developing my model to predict neutral losses. My novel approach provides a critical step to the biological understanding of phosphorylation events and the effective development of medical and pharmacological tools to correct biochemical pathways for targeted treatments that reduce risk and discomfort for patients.

Environmental Effects on the Embryonic Development of Sea Urchins

Diya Mehta, Grade 8 © 2023

Reason or Problem Statement

Humans have had a significant impact on marine life due to the pollution they have caused. The three main things that are affecting marine life are rising temperatures, sound pollution, and light pollution; all of which affect organisms' feeding and reproduction. Global warming causes ocean temperatures to increase. Sound pollution is caused by oil rigs, container ships and seismic air guns. Light pollution is also caused by man made tools in the ocean as well as the depletion in the ozone layer. These problems have an obvious effect on adult marine organisms, posing the question: How do these environmental conditions affect the embryotic development of marine life?

Methods Procedure and/or Approach

Fifteen Lytechinus Variegatus sea urchins were injected with KCl. Sperm and eggs were collected. Fertilization was then carried out with the released gametes. The zygotes were placed in different temperatures (72°F, 76°F, 82°F), sound levels (74 dBa, 90 dBa, 105 dBa), and lighting conditions (blackout, sunlight, UVB) and observed under a microscope every 7-12 hours up to 36 hours.

Conclusion and/or Implications

The increased temperatures caused the embryos to develop faster as well as develop abnormally. The 90 dBa and 105 dBa sound levels also caused more abnormalities in the embryos. The "perfect" conditions were 72°F, 74 dBa and sunlight, which are normal environmental conditions for Lytechnius Variegatus. The embryos under these circumstances developed at a normal rate and barely had any abnormal development. This proves that humans' effect on the environment (temperature, light, sound) is affecting marine organisms right from the start of their lives.

CSEF Tour/Presentation Information

Tour Registration
The tour registration form can be found only online at **https://csef.natsci.colostate.edu/students/** under the CSEF Schedule of Events and Activities for Finalists tab. All tours will be filled on a first-come, first-served basis. Pre-ordering will begin on March 11th and continue until March 31st.

Pick-up and Payment
Tickets can be picked up in Room 322 of the Lory Student Center. Pre-registered tickets may NOT be exchanged and payment is due at the time of pick-up. Cost for all tours/presentations is $1/ticket – exact change is preferred.

Cancellation and Refunds
No refunds will be made for tour tickets unless a tour is cancelled. If you have purchased a ticket and cannot go on that tour, you may sell/give the ticket to another CSEF participant.

Tour Departures
All tours and presentations will take place on the CSU campus. Tour groups will leave the Lory Student Center at the time designated on the tour ticket. It is suggested that you arrive at the departure room at least 10 minutes early. Volunteers will be on hand to lead the group to the tour destination. **If the tour guide is not there at least 5 minutes before the designated leave time, please let someone know at the registration both outside of the Grand Ballroom ASAP!** Presentations being held in the Lory Student Center will begin at the time designated on the tour ticket – you should arrive at least 10 minutes early for these as well.

Tentative List of Tours
Below is a **PROPOSED** list of tours/presentations being offered at the 2024 CSEF. For an updated list and full descriptions, please visit the CSEF Tour website after March 1st.

Proposed Tours:

Anatomy/Physiology Labs
CSU Campus
CSU Campus Sustainability
CSU Greenhouses
CSU Meat Lab
CSU Multifunctional Polymers & Composites Lab
CSU Weather Station
Electron Microscopy Center
Gillette Museum of Arthropod Diversity
Intro to Veterinary Medicine
National Center for Genetic Resources Preservation
Walter Scott, Jr. College of Engineering Labs

Proposed Presentations:

TBD (Agronomy Club)
Crystallization (BIOMOD Club)
3D Journey Through Space & Time (NSEOC)
Nanomaterials (Chemistry Club)
Medical Mysteries (Dept. of Microbiology)
STEM Kits (CSU STEM Educators)
Forensic Sciences (Dr. Bob Morrow)
Internet Security (Hashdump Security Club)
Muscles Alive! (Dept. of Health & Exercise Sciences)
TBD (Neuroscience Club)
Star Lab (Timnath Elementary School Students)
Amateur Radio (WWV Amateur Radio Club)
TBD (Psychology Alliance)

Judging at the Colorado Science & Engineering Fair

Roughly 150 professional scientists and engineers volunteer to interview the Finalists for the CSEF Grand Awards. They form 24 Grand Award Judging Teams that meet with the Finalists in each of the categories in both the Junior and Senior divisions. The captains of each judging team form the Best-of-CSEF Project Judging Team that determines the top five Senior Division and top three Junior Division project winners.

Roughly 50 companies, professional organizations, and individuals send volunteers to interview the Finalists for Special Awards and Scholarships that represent a specific scientific topic that interests them. Each Special Award Organization has its own criteria for presenting awards and will not necessarily visit every project within a given category. To see what Special Awards Judges are looking for in projects, please visit the CSEF website at **https://csef.natsci.colostate.edu/special-awards/.**

What are the judges looking for?

Judges will examine your project very carefully to confirm the correctness of the research. This is an educational experience for BOTH the Finalist and the interviewer. It is their job to find out how much **YOU** know about your project. They do this by asking you questions to learn more about your work. You will be evaluated on how well you **ACTUALLY DID** your project compared to how well you **COULD** have done it.

Projects are judged on the following:

- The quality of the work done; how well do you understand the project and subject area?
- How the project involves laboratory, field or theoretical work – not just library research or gadgeteering.
- How the project compares with other projects in the same category and division at the state level.

In particular, judges evaluate:

- how well a student followed the scientific method or reached the engineering, mathematics or computer science goals;
- the detail and accuracy of the research data book; and
- whether the experimental procedures were used in the best possible way.

Judges look for well thought-out research. They look for how significant your project is in its field, as well as how thorough you were. Did you leave something out? Did you start with four experiments and finish only three?

The judges applaud those students who can speak freely and confidently about their work. They are not interested in memorized speeches; they simply want to **TALK** with you about your research to determine if you have a good grasp of your project from start to finish. Besides asking the obvious questions, judges often ask questions to test your insight into your project, such as "What didn't you do?" or "What would be your next step?"

Grand Award Judging Criteria – ***The decision of the judges is final.***

Evaluation of projects is done on work performed by exhibitors, not on the value of accessory equipment either borrowed or purchased.

Creative Ability: Creative research should support an investigation and help answer a question in an original way.

Scientific Thought/Engineering, Mathematics or Computer Science Goals: Is the problem/objective stated clearly and unambiguously? Was the problem sufficiently limited to allow a plausible approach? Was there a procedural plan for obtaining a solution? Are the variables clearly recognized and defined? Is there adequate data to support the conclusions? Is the solution a significant improvement over previous alternatives?

Thoroughness: Was the purpose carried out to completion within the scope of the original intent? Are the conclusions based on a single experiment or replication? How complete are the project notes?

Skill: Does the student have the required laboratory, computation, observational, and design skills to obtain supporting data? Where was the project performed? Was the project completed under adult supervision, or did the student work largely alone?

Clarity: How clearly does the student discuss the project and explain the purpose, procedure, and conclusions? How well does the project display explain the project? Are important phases of the project presented in an orderly manner?

Teamwork: Are the tasks and contributions of each team member clearly outlined? Was each team member fully involved with the project, and is each member familiar with all aspects? Does the final work reflect the coordinated efforts of all team members?

CSEF Special Awards

Technical Writing Awards

The CSEF has two technical writing awards, one for senior division participants and one for junior division participants. The Senior Division award is named in memory of Ralph Desch, a former board member, one of the driving forces in the Colorado Science & Engineering Fair, a technical writer, and an employee of the National Bureau of Standards. The Junior Division award is named in memory of Elemer Bernath, one of the founders of the Colorado Science & Engineering Fair, who passed away in December 2019.

To be considered for either award, you must prepare a technical report as if you were planning to be published in a scientific or technical journal. This is separate from your project write-up. The winners receive a $100 cash award.

Technical reports may differ in their organization, but the following format is typical:

I. **Introduction** – includes a literature review (with appropriate citations) and the research questions/objectives/hypotheses

II. **Method** – explains how the data were collected, analyzed, and interpreted

III. **Results** – presents data, usually in tables and/or figures, including a brief narrative reviewing the key findings

IV. **Discussion** – explain key findings, and interpret data and graphs; other literature relevant to the results, and acknowledgements of limitations of the study are also included here

V. **Conclusions**

VI. **References** – includes literature cited in the paper, not the works cited in the project on the topic

VII. **Appendix**

2023 Ralph Desch Memorial Technical Writing Award Winners
Alexander Zhang & Stella Laird with Margaret Arthur & Marissa Martinez
(Honorable Mentions)

Judges for this award assess the technical quality of the report-- the organization and quality, including correct grammar, spelling, mechanics, format, layout, etc. If you have a sample article from the scientific or technical journal in which you aspire to be published, it is helpful to include that as well.

Students wishing to be considered for this award must indicate this on their registration form and submit an electronic copy to **csef@colostate.edu** by March 22nd so the judges have time to read them all and make a selection.

Student Choice Awards

The Colorado Science and Engineering Fair provides awards for Finalists to choose your favorite Junior Division project and Senior Division project. Each winner will receive $100. Be sure to vote!

Pioneers of Science Awards

The Board of Directors of the Colorado Science & Engineering Fair understands the hard work and dedication that goes into completing a research project of the caliber it takes to become a CSEF Finalist and congratulates all of you. Each year, board members meet certain students who are impressive in regards to their enthusiasm and hard work as they take their initial steps into the world of scientific research. These students have demonstrated sufficient promise in their research that the members of the Board of Directors have chosen to recognize them for following in the footsteps of the great pioneers of science, mathematics, and engineering.

Other Special Awards

The David Young Award for the Best Use of Statistics

This is a statistical award named in the memory of David Young from the University of Colorado at Denver, Department of Medicine and Biometrics and presented by the Colorado/Wyoming Chapter of the American Statistical Association. David's skills in both science and statistics allowed him to collaborate with medical investigators at the University of Colorado and help communicate results. In this spirit, this award is presented for the best use of statistics in a science project.

To be considered for this award, you must submit a copy of a single graph or table from your project along with a paragraph describing its significance. Judges will be looking at this document along with viewing the project, so background information is not critical. Winners from each division will be awarded $200, a student membership in the American Statistical Association, and acknowledgement in *AMSAT News*. The winners will also be given the opportunity to give a brief presentation of their results at the ASA chapter's Spring Meeting at the National Center for Atmospheric Research in Boulder.

Each project will be selected based on the following:

- Were statistical issues considered in the design of the experiment? Examples of such issues include: estimating sample sizes, controlling for possible confounding variables or calculating confidence intervals.
- Were appropriate graphics used to present and interpret the results?
- Was a statistical test used to draw conclusions about the data collected during the experiment? Examples of statistical test are the t-test and analysis of variance.
- Can the student explain the results within a statistical context? How likely are the results a matter of chance?

Thermo Fisher Junior Innovators Challenge

The Thermo Fisher Junior Innovators Challenge is a competition for 6th, 7th and 8th grade students who complete a science, engineering or math project, enter it into competition at a Society for Science affiliated science fair and are nominated to compete at the national level.

Nominees will enter the inventors challenge by completing an online application where they will be asked to explain their science project and to evaluate their use of STEM principles – science, technology, engineering and math – in the development and presentation of their project.

From the national entrants, 300 Semifinalists will be selected which will be narrowed down to 30 Finalists who win an all-expense paid trip to Washington, DC, where they will compete for awards and prizes, including the top education award of $25,000.

30th Annual Poster Art Contest

Invitation to Enter

This contest is not a requirement, but if you wish to enter artwork in the poster contest, please follow these guidelines:

- ✓ Poster designs must represent some aspect of science, engineering, and/or mathematics.
- ✓ Black and white illustrations only (ink is preferred); no color entries.
- ✓ Design area is limited to 8" wide by 10.5" tall.
- ✓ Student collaborations (up to two students) on poster designs is permitted.
- ✓ Print your name and school name on the back of your entry in pencil.
- ✓ Entries must include the following information about the fair prominently displayed somewhere in the design (preferably in an area where we can digitally enhance this information):

  Colorado Science and Engineering Fair
  For Colorado Students in Grades 6 to 12
  Hosted by the College of Natural Sciences Education Outreach Center
  At Colorado State University
  Fort Collins, Colorado
  April 10 – 12, 2025

- ✓ Submit your entries at the CSEF registration booth on Thursday, April 11, 2024.
- ✓ The Poster Art Contest is open to any Colorado student in grades 6 to 12.

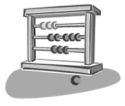
All entries that meet these guidelines will be considered.
The winner will receive a $100 cash award,
and the design will be used on the
2025 Colorado Science and Engineering Fair publications.




The winner will be announced at the
2024 Awards Ceremony on
Friday, April 12, 2024






CSEF Volunteer Registration Form

Thank you for considering volunteering for the 69th Annual Colorado Science and Engineering Fair being held April 11 - 13, 2024 at the Lory Student Center on the Fort Collins campus of Colorado State University. CSEF has many areas where volunteers are needed. We need help with the following jobs.

Name:_____ Email:_____

Complete Mailing Address:_____

I would like to volunteer with the following job(s): At the following day(s) & time(s) if applicable:

- ❒ Room Set-Up
  - Thursday, 7 a.m. – 9 a.m.
- ❒ Parking Attendants (off site) _____
  - Thursday, 7 a.m. – Noon (2 ½ hour shifts)
- ❒ Tour Ticket Sales
  - Thursday, 8:30 a.m. – 11:30 a.m.
- ❒ Project Drop-Off Aide _____
  - Thursday, 8:30 a.m. – 11:30 a.m. (1 ½ hour shifts)
- ❒ Official Photography (taking photos of students at projects)
  - Thursday, 8:30 a.m. – 12 noon (**must have own digital camera**)
- ❒ Display & Safety Inspections (checks of student projects)
  - Thursday, 8:30 a.m. – 12 noon
- ❒ Finalist Check-In
  - Thursday, 9 a.m. – 12 noon
- ❒ Monitoring Exhibit Halls (please mark which day(s) you can help)
  - Thursday, 12 noon – 5 p.m. (2 hour shifts) _____
  - Friday, 9 a.m. – 5 p.m. (2 hour shifts) _____
  - Saturday, 9 a.m. – 11 a.m. _____
- ❒ Help at the Awards Ceremony
  - Friday, 5 p.m. – 9 p.m.
- ❒ Pizza Party
  - Saturday 10:30 a.m. – 12 noon
- ❒ Project Teardown & Clean-up
  - Saturday 11 a.m. – 1 p.m.
- ❒ Any job I can help with during these times: _____

As a thank you, we would like to offer you a CSEF t-shirt or you can decline the t-shirt and we will use those funds elsewhere.

- ❒ Yes – I would like a CSEF T-shirt as a thank you for my volunteering, my size is:_____
- ❒ No – I would like the CSEF to use the money elsewhere.

This form can be mailed to the address listed below, emailed to **csef@colostate.edu** or submitted online at **https://csef.natsci.colostate.edu/volunteers/**.

CSEF – Volunteers
P O Box 1465
Fort Collins, CO 80522-1465

Volunteer assignments will be sent out in late March. Thank you for your help.

Required Project Presentation Instructions

The project presentation is **in addition to** the project poster used during in-person fairs – this is NOT a 12-page report. The following are instructions/guidelines for creating the slides. We have created a Powerpoint Template as well as a Google Slides Template for these types of projects and it is recommended that you use one of them in creating your digital project display. The templates can be found on the CSEF website: **https://csef.natsci.colostate.edu/students/**.

Science Project Presentations
Engineering Project Presentations
Math/Computer Science Project Presentations

- You may add more slides as needed to the template, up to a **maximum of 12 printed pages**.
- If using the provided templates, do not change the page settings on the template – they are set up so that the template you fill out will print to pdf with the correct page size (8½" x 11") and orientation (Landscape).
- The PDF document must open with the default magnification set to "Fit Page" so that **the entire page is visible at the same** time.
- The PDF document must be made **without animations or active hyperlinks**. The document must not have instructions to open in "full screen mode". Eliminating this mode automatically prevents page transitions, embedded videos or animations from playing, so do not attempt to include them. (There are provisions for submitting an optional video if you need to show a demonstration of your project.)
- It is recommended that you use a white background with black text for maximum contrast. If you do change these, make sure to use a light-colored background with dark text to support readability.
- It is recommended that you use a font such as Arial, Calibri, or Century Gothic for readability.
- Page titles should all be the same font size and should be larger than headings within each page. In turn, headings should be larger than body text.
- All text should be easily readable when viewing the entire page at once. The smallest allowable font size for body text is 14 point (unless you are adding a figure caption or photo credit – these can be 10 point).
- Avoid long expository paragraphs. State your points succinctly.
- Use bullets to set out individual points of interest. Use numbered lists when the ordering of points of interest is important.
- All Project Presentation elements must conform to Display & Safety rules as if placed on a physical poster for display to judges and the public (see page 14).
- **Once completed, delete the instruction slide before printing to a PDF file. Your resulting Project Presentation should be at most 12 pages.**

Optional Project Video & Demo Video Instructions

You may opt to record a video (**2-3 minutes max**) explaining your project. While judges will have access to this video, it will not be the focus of their project review.

What to include in your project video:

1. Introduce Yourself:
   - State your full name.
   - You may include your school and/or town if you wish.
   - Rather than reciting your project title, consider explaining your project in a single sentence.
2. Explain Your Project:
   - Summarize your research in these main points:
     - What did you do?
     - What did you find?
     - What conclusions did you draw?
   - You can use any props or visuals you may have that are within the Display & Safety guidelines (page 14). There is another option for doing demonstrations outside of this video.
   - Do not include the faces of anyone in your video other than the student researcher(s) of the project.
   - Your optional project video **must be linked from YouTube**, demos and optional materials may be uploaded into Google Drive. In YouTube, your video may be uploaded and posted as "unlisted" so that only those with a direct link can access it. Unlisted videos are not searchable or available to the public. You can choose to list your video publicly, but should check with your parent or guardian first.

You may also opt to record a video (**1-2 minute max**) that shows any demonstrations of your project that you would normally have wanted to show in person (especially for engineering type projects).

What to include in your demonstration video:

- Explain what is being shown in the video in as few words as possible. Try to let the images speak for themselves.
- Make sure anything you are demonstrating is done in a safe manner or it will be flagged as inappropriate by the Display & Safety Committee.
- The project demo video may include people other than the student researcher(s) as long as they are not identifiable (no faces).
- You will need to post this video in a Google Drive folder (make sure to set the permissions so anyone with the link can access it) or another online video posting site (like YouTube).

Best practices for filming:

- Film in a well-lit and non-distracting environment so the viewer's focus stays on you and your work.
- For best results, film your video horizontally (landscape).
- Keep the camera still and in place during filming.
- Speak clearly and loudly enough that the recording is able to pick up every word you say.
- Avoid long pauses and filler phrases.
- Listen to your video after recording to ensure your voice is clear and audible, and that the video has not picked up too much background noise.

Other Optional Material Instructions

Research Paper: The CSEF does not require any project to include a research paper. However, many finalists have completed such a paper through the research process and would include it at their booth. If you have prepared such a paper, you may upload it to share with judges, though judges are not required to review it. Students wanting to be considered for either of the Technical Writing Awards must also email their submission to the CSEF at **csef@colostate.edu** by March 22nd.

Statistical Award Sample: The CSEF does not require any project to participate in the American Statistical Association special award judging. If you have elected to participate, you must prepare a statistical sample as outlined on page 20 and may choose to upload it as an additional PDF document, but you must email the submission to CSEF at **csef@colostate.edu** by March 22nd.

Quad Chart: A "quad chart" is a single page divided into four quadrants providing a high-level summary of the project. It is intended to be more visual than detailed in order to quickly introduce the judges to what is important about your project.

- You must use a wide-screen page format similar to the American Legal standard 8½" x 14" and arranged in Landscape orientation.
- The page background color must be a light color and text color must be predominantly dark to support readability.
- The minimum allowable font size is 13 point. Exception: You may use a smaller font size, down to 9 point, for figure captions or photo credits.
- All four quadrants of your Quad Chart should each be the same size with a single border line delimiting each, as in the examples below. The Title section should be only as tall as necessary to include your project title and other identifying information (see section on Quad Chart Title).
- The Quad Chart should not include a bibliography, references, or acknowledgments.
- All Display & Safety rules must be followed.

<table>
<tr><td colspan="2">Project Title
Student Name(s); School; City</td></tr>
<tr><td>Q1: Scientific Question

• Bullet 1
• Bullet 2
• Bullet 3

Image
credit</td><td>Q3: Data Analysis & Results

• Bullet 1
• Bullet 2

Data Chart
credit</td></tr>
<tr><td>Q2: Methodology

Image
credit

• Bullet 1
• Bullet 2
• Bullet 3
• Bullet 4</td><td>Q4: Interpretation & Conclusions

• Bullet 1
• Bullet 2
• Bullet 3</td></tr>
</table>

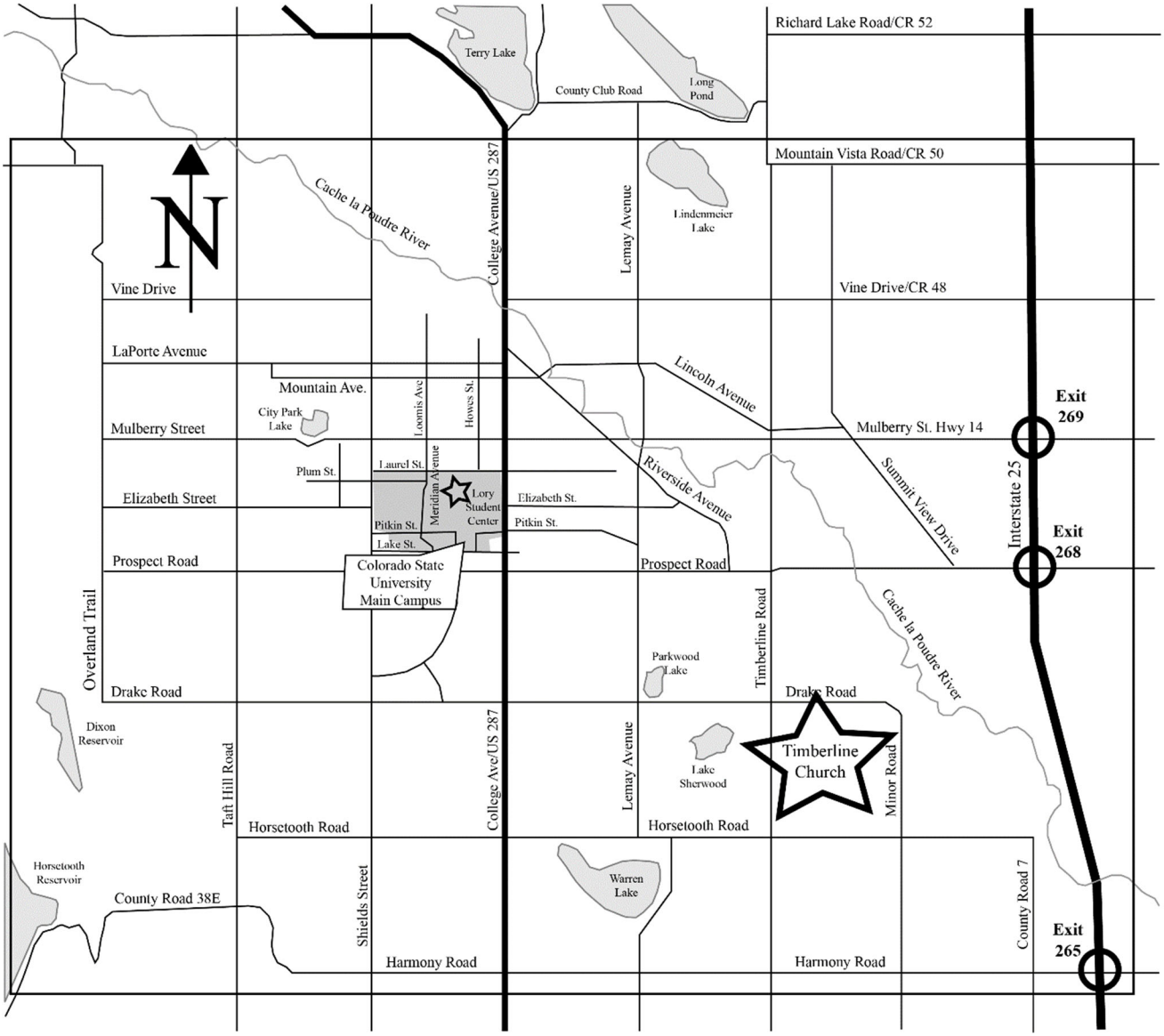
Directions & Parking Instructions

Thursday

Due to the limited amount of parking on the Colorado State University campus, we have arranged for off-campus parking and will shuttle people to the LSC on ***Thursday only***. Parking will be guaranteed at the Timberline Church, whereas, there is no guarantee of finding a spot on or near campus. CSU shuttle buses will run between the Timberline Church and the CSU main campus between 7 a.m. to 6 p.m. roughly every half hour. (**NOTE:** only ONE bus will run between 11 a.m. and 4 p.m.) and will drop you off along Meridian Avenue by the Lagoon (just West of the LSC).

To reach the Timberline Church from I-25, take Exit 265 (Harmony Road), West to Timberline Road and turn North (right) onto Timberline. Take Timberline to Custer Drive (the street between the church and King Soopers) and turn East (right). Take Custer Drive to Illinois and turn right into the Timberline Church parking lot. Our area to park in will be in the northeast corner of the lot. When using Google Maps to get specific directions from your home or school, use 2908 South Timberline Road, Fort Collins, CO 80525 as the address for the church.

NOTE: If you want to self-park on campus on Thursday, please see the instructions on Page 27 for Friday.



Directions & Parking Instructions

Friday

For those visiting the CSU campus on Friday to take part in the tours of campus labs, the guest speaker and viewing the projects, you will be on your own for parking. Information on visitor parking at CSU can be found on the web site - **http://pts.colostate.edu/visitors/parking/**. It is suggested you check this site for the latest on construction and open parking lots. The keys to visitor parking at CSU are:

- There are always various construction projects going on at CSU, making parking difficult at times – please plan ahead and check the Parking Services website for updates.
- You can purchase a daily permit online (**https://colostate.t2hosted.com/per/index.aspx)** ahead of time using the Guest login.
- The 2023/2024 academic year rate for hourly parking on campus is $2 per hour. When you arrive in a lot with visitor parking, have your license plate number ready to enter into CSU's hourly permit vending machine. You can pay by credit card for the amount of time you wish to park. Your license plate number will serve as your permit. You can also download the parking mobile app to pay with your phone - **https://parkmobile.io/**.
- Around the Horn is a free on-campus shuttle that connects to most visitor parking lots with a bus that loops campus every 20 minutes from 7 a.m. to 6:40 pm. Monday through Friday. (**www.ridetransfort.com/img/site_specific/uploads/HORN.pdf**).
- Most lots have hourly metered parking spots during permit hours (most lots are enforced 7:30 a.m. to 4 p.m. daily). Check the signs posted in each lot for enforcement times; some lots have extended enforcement hours. The lots where you can pay for up to 8 ½ hours include #195 (Moby), #310, #425, #570 (Lake Street Garage), #577 (South College Garage), #725 (Vet Teaching Hospital), & #740 (Tennis Pavilion).
- The parking lots that are closest to the Lory Student Center (but they fill up fast!) are: Lot #310 (Engineering) and Lot #425 (Morgan Library).
- The parking lots that have visitor parking available and are connected to Around the Horn are: Lot #195 (Moby); Lot #577 (South College Garage); Lot #440 (University Station); Lot #570 (Lake Street Garage); Lot #725 (Vet Teaching Hospital); Lot #740 (Tennis Pavilion).
- **ALL** vehicles (including school buses) are required to have a CSU parking permit displayed while on campus Monday – Friday. However, buses of any size must park on the west side of the Moby arena lot (#195) off of Shields and NOT in Lot #310 (Engineering).
- Parking for people with a valid handicapped permit may park in any of the marked handicapped stalls but must have a CSU parking permit or pay the meters if applicable.
- CAR POOL!!!! If you are staying in Fort Collins overnight, make plans with others staying in town for transportation to and from campus. Or check with your hotel; they may have free shuttle service to campus. If you are driving to Fort Collins each day, try to carpool with others from your area.
- Try to stay at a hotel that is close to campus and walk over.

Saturday

Parking is not enforced (except for handicapped and J permit spots) on Saturdays. The parking lots closest to the Lory Student Center are Lot #310 (Engineering) and Lot 425 (Morgan Library).

CSEF is not responsible for parking citations issued by CSU to CSEF Finalists, their families, teachers, or any of the judges and volunteers.

Lory Student Center - 3rd Floor