First Nations Launch Rocket Competition 2023

October 18, 2022
Meet the Team

- **Wisconsin Space Grant Consortium**
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  - Christine Bolz, Assistant Director, FNL Program Director  
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  - Courtney Kadolph, FNL Project Coordinator  
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- **First Nations Launch Administrative Team**
  - Frank Nobile, Technical Coordinator, Wisconsin Tripoli  
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  - Structures Engineer – Blue Origin
  - Bob Justus, Illinois Tripoli  
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- **NASA**
  - Shanessa Jackson, Kennedy Space Center
What is “First Nations Launch”?

- A competition offered to tribal colleges and universities, Native American Serving Nontribal Institutions, in addition to AISES collegiate chapter students, to demonstrate engineering and design skills through direct application in high-power rocketry.

- The competition requires teams of undergraduate students to conceive, design, fabricate and compete with high power rockets.

- The restrictions on rocket motors and dimensions are limited so that knowledge, creativity and imagination of the students are challenged.

- The end result is a great aerospace learning experience unique to the Native American communities.
NASA Artemis Student Challenge: First Nations Launch
Competition Date

- April 28, 2023
  - Carthage College, Kenosha, WI
    - Welcome Breakfast
    - Motor Build Workshop
    - Breakout Sessions
    - Final Safety Inspection
    - Oral Presentations

- April 29, 2023
  - Richard Bong Recreational Park, Kansasville, WI
    - Launch Day
  - Carthage College, Kenosha, WI
    - Closing Banquet

- April 30, 2023
  - Rain date
2023 First Nations Launch (FNL) Teams

- **GATEWAY, MOON & MARS CHALLENGES**
  - 24 teams
  - 4-6 members per team on average
  - NOI’s due October 21, 2022 (Moon & Mars)
  - Proposals and Preliminary Budgets due December 12, 2022 (Moon & Mars)
  - NOI’s are due December 16, 2022 (Gateway)
    - Early submissions highly encouraged
Launch 2 Learn (L2L)

Introductory Rocket Workshop
Participate at Carthage College

- Carthage College (Gateway Challenge/New Teams)
  - Three individuals per school (one advisor and two students)
  - Travel, lodging, and workshop meals provided, dinner on your own
  - Rocket kit, motor, and Tripoli Rocketry Association Level 1 certification supplied
  - Maximum 15 participants

- Virtually
  - Three individuals per school (one advisor and two students) sponsored by WSGC – Maximum 30 participants
  - Rocket kit and supplies provided by FNL
  - Motor and Tripoli Rocketry Association Level 1 certification supplies at TRA Certification Launch

SUBMIT a Notice of Intent to Compete in order to be eligible for L2L
https://spacegrant.carthage.edu/about/login/
REGISTER for the L2L Workshop
https://spacegrant.carthage.edu/first-nations-launch/l2l-workshop/
Gateway Challenge

- Teams are required to design and construct a dual deploy high-power rocket from the following list:
  - Mad Cow 4” Diameter Super DX-3 kit
  - Mad Cow 4” Diameter Fiberglass Super DX-3 kit
- Teams may customize their kit with special add-ons provided by the manufacturer.
- Pyro energetics of Jolly Logic altimeter shall be used for main deployment recovery.
- There is no payload associated with this challenge, with focus being on the safe and complete selection, simulation, procurement, assembly/fabrication, and flight of the kit rocket.
- The rocket shall reach an apogee of 2,500ft AGL.
Gateway Flight Profile

2500 ft. → Apogee

Coast Ascent

Drogue Parachute → Descent

Main Parachute Deployment

Lift Off

Touch Down

FJN 2023
Moon Challenge

- Moon teams are required to design, test and fabricate specific structural design components:
  - Nose Cone/Shoulders
  - Bulkheads/Centering rings
  - Fins
  - Avionics Sled

- The focus is on material science, fabrications, and understanding material properties and strengths.

- Teams shall design their rockets for an expected apogee of 3000' - 4000' AGL.
Mars Challenge

- Select a 'base' dual deploy kit from our pre-selected list.
- Design, test, and fabricate all structural dual deploy rocket components:
  - Airframes (body tubes)
  - Couplers (internal tubes)
  - Nosecones / shoulders
  - Bulkheads / Centering Rings
  - Fins
  - Avionics sled
- Utilize a COTS motor mount tube.
- Select a motor from those listed in our handbook.
- Design their rockets for an expected apogee of 3500' - 4000' AGL.

Photos courtesy of PLTW and Wikipedia
Competition Scoring Summary

- Projects are judged on:
  - Written design reports
  - Virtual presentations (including launch weekend presentation)
  - Launch day flight/challenge performance

- These coincide with project milestones:
  - Proposal, PDR, CDR, FRR and PLAR

- Bonus points may be earned through outreach efforts

- An example of one item (among dozens of items scored on launch weekend) include:
  - Electronic payload bays are judged on neatness and simplicity at launch weekend

Example Only
Supplied by WSGC to Teams

- Marketing Materials
  - Posters and Postcards

- Rocketry Workshop (Up to 3 members per team)
  - Level 1 Rocketry Workshop during October (in-person at Carthage College) and January (Virtual)

- Project Travel Award of $4000
  - Reimbursements issued through Carthage College
  - Additional travel funds for teams traveling from Mountain, Pacific, Hawaiian, or Alaska time zones

- Two (2) Rocketry Reference Books (New College/Universities)
  - Modern Rocket Design and Construction
  - Modern High Powered Rocketry 2

- Report Feedback
  - Teams will receive report feedback one (1) week prior to next report

- Low-Powered Rocket for Demo Flight
  - Each team to fly low-powered demo flight

- Motors (1) and Casing at Competition
  - Competition motor and a motor build workshop during Competition Launch

- Ejection Charges at Competition

- Hotel Accommodations Launch Weekend
  - Max three (3) rooms for three (3) nights at select hotel

- Select Meals Launch Weekend
  - Friday breakfast and lunch, Saturday lunch and dinner
# Scoring Breakdown for MARS / MOON Teams

<table>
<thead>
<tr>
<th>Activity</th>
<th>Documentation</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competition Proposal</td>
<td>Written Report</td>
<td>5 pts.</td>
</tr>
<tr>
<td>PDR Presentation w/ judges</td>
<td>Virtual Presentation</td>
<td>5 pts.</td>
</tr>
<tr>
<td>CDR Presentation w/judges</td>
<td>Virtual Presentation</td>
<td>5 pts.</td>
</tr>
<tr>
<td>FRR Virtual Safety Inspection</td>
<td>Virtual Presentation</td>
<td>5 pts.</td>
</tr>
<tr>
<td>Post-Launch Assessment Review Report (PLAR)</td>
<td>Written Presentation</td>
<td>10 pts.</td>
</tr>
<tr>
<td>Launch Weekend Oral Flight Readiness Presentation</td>
<td></td>
<td>5 pts.</td>
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<tr>
<td>Launch Weekend- Mission Performance</td>
<td></td>
<td>10 pts.</td>
</tr>
<tr>
<td>Launch Weekend- Challenge</td>
<td></td>
<td>10 pts.</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>100 pts</td>
</tr>
</tbody>
</table>

- **BONUS**
  - Conduct an Education Outreach Project
  - Submit Education/Public Outreach Form
  - Up to 10 pts

Submissions received after 11:59 pm CST on the due date will receive a deduction of 20% for each day they are late.
Design Reports Overview

- **Purpose:**
  - To communicate the engineering and design effort involved
  - To perform analysis of predicted performance
  - To compare actual to predicted performance
  - To SHOW the design and construction (pictures, diagrams, etc.)

- Reports are due when posted on website calendar:
  - [https://spacegrant.carthage.edu/first-nations-launch/calendar/](https://spacegrant.carthage.edu/first-nations-launch/calendar/)

- Must use the Report / Presentation templates:
  - [https://spacegrant.carthage.edu/first-nations-launch/rubric/](https://spacegrant.carthage.edu/first-nations-launch/rubric/)

- There are **5 reports** and **3 presentations** for the year
<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 13, 2022</td>
<td>Informational Meeting @ 4:00 pm CDT (Zoom)</td>
</tr>
<tr>
<td>Sep 26, 2022</td>
<td>Early Bird Non-binding Notice of Intent to Compete Due (Moon/Mars)</td>
</tr>
<tr>
<td></td>
<td>Launch 2 Learn Level I Rocket Certification Workshop @ Carthage College Request Due</td>
</tr>
<tr>
<td>Oct 7, 2022</td>
<td>Visit FNL at the AISES Conference <a href="https://conference.aises.org/">https://conference.aises.org/</a></td>
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<tr>
<td>Oct 18, 2022</td>
<td>Informational Meeting @ 4:00 pm CDT (Zoom)</td>
</tr>
<tr>
<td>Oct 21, 2022</td>
<td>Non-binding Notice of Intent to Compete Due (Moon/Mars)</td>
</tr>
<tr>
<td></td>
<td>Early Bird Non-binding Notice of Intent to Compete Due (Gateway)</td>
</tr>
<tr>
<td>Oct 22-23, 2022</td>
<td>Launch 2 Learn Level I Rocket Certification Workshop @ Carthage College (registration required)</td>
</tr>
<tr>
<td>Oct 25, 2022</td>
<td>TRA/NAR Mentorship Requirement Webinar @ 4:00 pm CDT (Zoom)</td>
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<tr>
<td>Oct 28, 2022</td>
<td>Award Announcement (Moon/Mars/Gateway)</td>
</tr>
<tr>
<td>Nov 1, 2022</td>
<td>Kick-off Meeting @ 4:00 pm CDT (Zoom) (Moon/Mars)</td>
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<tr>
<td>Nov 8, 2022</td>
<td>Proposal, Budget, and Design Review Development Webinar @ 4:00 pm CST (Zoom) (Moon/Mars)</td>
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<tr>
<td>Nov 14, 2022</td>
<td>Award Acceptance Material Due (Moon/Mars)</td>
</tr>
<tr>
<td>Nov 15, 2022</td>
<td>Structures Webinar @ 4:00 pm CST (Zoom)</td>
</tr>
<tr>
<td>Nov 22, 2022</td>
<td>Project Management Webinar @ 4:00 pm CST (Zoom)</td>
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<tr>
<td>Nov 29, 2022</td>
<td>Introduction to RockSim Webinar @ 4:00 pm CST (Zoom)</td>
</tr>
<tr>
<td>Dec 12, 2022</td>
<td>Proposal Due (Moon/Mars)</td>
</tr>
<tr>
<td></td>
<td>Preliminary Budget Due (Moon/Mars)</td>
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<tr>
<td></td>
<td>Flysheet Due (Moon/Mars); RockSim Due (Moon/Mars)</td>
</tr>
<tr>
<td>Dec 13, 2022</td>
<td>Build &amp; Assembly Techniques Webinar @ 4:00 pm CST (Zoom)</td>
</tr>
<tr>
<td>Dec 16, 2022</td>
<td>Notice of Intent to Compete Due (Gateway)</td>
</tr>
<tr>
<td></td>
<td>Request Virtual Rocketry Workshop Due</td>
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<tr>
<td>Date</td>
<td>Activity</td>
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<td>---------------------------------------------------------------------------</td>
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<tr>
<td>Jan 2, 2023</td>
<td>Award Announcement (Gateway)</td>
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<tr>
<td>Jan 3, 2023</td>
<td>Kick-off Meeting (Gateway) at 4:00pm CST (Zoom)</td>
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<tr>
<td>Jan 10, 2023</td>
<td>Grant Management Webinar @ 4:00 pm CST (Zoom)</td>
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<tr>
<td>Jan 12, 2023</td>
<td>Launch 2 Learn Kit Reveal @ 4:00 pm CST (Zoom)</td>
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<tr>
<td>Jan 16, 2023</td>
<td>Award Acceptance Material Due (Gateway)</td>
</tr>
<tr>
<td>Jan 17, 2023</td>
<td>Avionics/Altimeters Webinar @ 4:00 pm CST (Zoom)</td>
</tr>
<tr>
<td>Jan 20-21, 2023</td>
<td>Launch 2 Learn Rocket Certification Virtual Workshop (Registration Required)</td>
</tr>
<tr>
<td>Jan 23, 2023</td>
<td>Preliminary Design Review (PDR) Report Due (Moon/Mars); Flysheet Due (Gateway/Moon/Mars); RockSim Due (Gateway/Moon/Mars); Flight Demo Due - Upload rocket demo flight video on Facebook and/or Twitter</td>
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<tr>
<td>Jan 24, 2023</td>
<td>Recovery Webinar @ 4:00 pm CST (Zoom)</td>
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<tr>
<td>Jan 30- Feb 2, 2023</td>
<td>PDR Virtual Presentations (Zoom) (Gateway/Moon/Mars)</td>
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<tr>
<td>Feb 6, 2023</td>
<td>Final Requests Due to Change to Different Competition Challenge</td>
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<tr>
<td>Feb 20, 2023</td>
<td>Patch Design Due</td>
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<tr>
<td>Feb 21, 2023</td>
<td>Advisor/Mentor Meeting @ 4:00 pm CST (Zoom)</td>
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<tr>
<td>Feb 27, 2023</td>
<td>Critical Design Review (CDR) Report Due (Moon/Mars); Flysheet Due (Gateway/Moon/Mars); RockSim Due* (Gateway/Moon/Mars); Final Motor Selection Due (Gateway/Moon/Mars); Official Team Roster &amp; Lodging List Due (Gateway/Moon/Mars); Team Bio Due (Gateway/Moon/Mars); Team Photo Due (Gateway/Moon/Mars); All Team Member Registration on WSGC Website &amp; FNL Application Due (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td>Mar 6, 2023</td>
<td>Reimbursements Due (First payout) (Gateway/Moon/Mars)</td>
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<tr>
<td>Mar 6-9, 2023</td>
<td>CDR Virtual Presentations/Initial Virtual Safety Inspection with WSGC (Zoom) (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td>Mar 28, 2023</td>
<td>Launch Operations Webinar @ 4:00 pm CDT (Zoom)</td>
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<tr>
<td>Apr 3, 2023</td>
<td>Flight Readiness Review (FRR) Report Due (Moon/Mars); Flysheet Due (Gateway/Moon/Mars); RockSim Due (Gateway/Moon/Mars); Educational Outreach Forms Due (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td>Apr 10-14, 2023</td>
<td>Final Virtual Safety Inspection with Tripoli Rocketry Association (Zoom) (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td>Apr 18, 2023</td>
<td>Advisor/Mentor Meeting @ 4:00 pm CDT (Zoom)</td>
</tr>
<tr>
<td>Apr 24, 2023</td>
<td>Oral Presentations PPT Due (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td>Apr 27, 2023</td>
<td>Teams Arrive in Wisconsin</td>
</tr>
<tr>
<td>Apr 28, 2023</td>
<td>Welcome Breakfast/Competition Kick-off @ 8:00 am CDT - Carthage College, Kenosha, WI</td>
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<td></td>
<td>Team Workday, Motor Build Workshop, Breakout Sessions, Final Safety Inspection @ 9:30 am – 4:00 pm CDT – Carthage College</td>
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<tr>
<td></td>
<td>Oral Presentations @ 6:00 – 9:00 pm CDT – Carthage College (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td>Apr 29, 2023</td>
<td>Launch Day @ 7:30 am- 3:00 pm CDT - Richard Bong Recreational Park, Kansasville, WI</td>
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<tr>
<td></td>
<td>Closing Banquet @ 6:30 pm CDT - Carthage College</td>
</tr>
<tr>
<td>Apr 30, 2023</td>
<td>Launch Rain Date</td>
</tr>
<tr>
<td>May 8, 2023</td>
<td>Final Reimbursements Due</td>
</tr>
<tr>
<td></td>
<td>Post Launch Assessment Review (PLAR) Report Due (Gateway/Moon/Mars)</td>
</tr>
<tr>
<td></td>
<td>2-3 Team Project Photos Due</td>
</tr>
<tr>
<td>Jun 1, 2023</td>
<td>Notification of Winners</td>
</tr>
<tr>
<td>Summer TBD, 2023</td>
<td>RockOn! 2023 @ Wallops Flight Facility (Moon Next Step Award 2023)</td>
</tr>
<tr>
<td>Summer TBD, 2023</td>
<td>Grand Prize Trip to a NASA Center (Moon and Mars Challenge Grand Prize Winners)</td>
</tr>
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Reach for the Stars

- Each team may request a “Reach for The Stars National Rocket Competition” kit.
- The team will then conduct a Reach for the Stars outreach event for 15 students age 10-18.
- RFTS participants will be eligible for the RFTS National Winners’ Celebrations at the U.S. Space and Rocket Center in Huntsville, Alabama.
Key Changes for 2023

- FNL website now has video series of instructional videos and webinars
  https://spacegrant.carthage.edu/first-nations-launch/rocket-instructional-videos-webinars/
- Only one competition motor provided per team
- New Awards
  - Top Advisor
  - Top Team Lead
  - Rookie Team
- Reach for the Stars
- Challenges build off each other
  - Gateway ➔ Moon ➔ Mars
Team COVID-19 Safety Plan

- Local Launch Site
- Local Mentor
- Local TRA/NAR Prefecture

Note: As the coronavirus (COVID-19) situation continues to evolve, FNL will closely monitor and follow guidelines from federal, state and community officials regarding on-site competitions. Protecting the health and safety of team members, staff and judges is our primary priority. Challenge managers will be in contact with participants on specifics and changes to the challenges, if any.
FNL COVID-19 Safety Plan

- Launch Site Protocol
- Carthage College Protocol
- Virtual, Hybrid, and In-Person Planning

Note: As the coronavirus (COVID-19) situation continues to evolve, FNL will closely monitor and follow guidelines from federal, state and community officials regarding on-site competitions. Protecting the health and safety of team members, staff and judges is our primary priority. Challenge managers will be in contact with participants on specifics and changes to the challenges, if any.
Advisor Support (Abotossaway)

- New Advisor Mentorship
  - Can pair up new - experienced Advisors

- Team Outreach Efforts
  - Can provide outreach ideas/support

- Team NAR / TRA Rocketry Mentor (required)
  - Will assist with finding your area rocket club

- Next Step Opportunities
  - NASA Student Launch Initiative, NASA RockOn!, Spaceport America Cup
Additional Resources

- FNL Website: https://spacegrant.carthage.edu/first-nations-launch/
- Tools and Tips
- Calendar
- FAQ
- Application Process
- Report Templates and Scoring Rubrics
- Patch Contest
- Competition Prizes
- Awards
- History