NORTH DAKOTA STATE SCIENCE & ENGINEERING FAIR

Hosted by the University of North Dakota
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NORTH DAKOTA STATE SCIENCE & ENGINEERING FAIR

COMMITTEE MEMBERS

2023 Chair
Brian Tande, Dean, College of Engineering & Mines

Publicity and Promotions
Deb Austreng, College of Engineering & Mines

Program & Activities
Gwen Klawon, College of Engineering & Mines
Karen Cisek, School of Medicine & Health Sciences
Dr. Laura Munski, Dakota Science Center
Andrew Hollingsworth, UND Admissions

Logistics & Communication
Gwen Klawon, College of Engineering and Mines
Karen Cisek, School of Medicine & Health Sciences
Dr. Laura Munski, Dakota Science Center

Awards
Dustin McNally, College of Engineering & Mines

Judging
Nuri Oncel, College of Arts & Sciences

Resources & Budget
Tonya Parton, College of Engineering & Mines
Brian Tande, Dean, College of Engineering & Mines

Other Committee Members
Kaitlin Lockett, Financial Aid Advisor
SPECIAL THANKS
TO OUR SPONSORS

Major Sponsors

ND IDeA Network of Biomedical Research Excellence (ND INBRE)
UND Office for Research & Economic Development
UND School of Medicine & Health Sciences
UND College of Engineering & Mines
UND College of Arts & Sciences
UND John D. Odegard School of Aerospace Sciences

Contributing Sponsors

Greater Grand Forks Convention & Visitors Bureau
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**UND MEMORIAL UNION**  
**MARCH 30TH & 31ST, 2023**

**2023 Associate Board Members**  
Patty Kratcha  
Bill Malaski  
Charles Schiltz  
Deb Moe  
Erica Larson  
Lorraine O’Shea  
Tina Pierce  
Peter Sykora (Executive Secretary)

**2023 Regional State Directors**  
Northwest (1): Deb Moe (Tioga, ND)  
Northeast (2): Lorraine O’Shea (Grand Forks, ND)  
Southwest Central (3): Erica Larson (Elgin/New Leipzig, ND)  
Southeast (4): Patty Kratcha (Hankinson, ND)  
Tina Pierce (Lisbon, ND)

**Awards Coordinator**  
Peter Sykora (Watford, ND)

**2023 ISEF Trip Director**  
Peter Sykora (Watford, ND)

**Scientific Review & Rules Compliance Committee**  
Deb Moe (Tioga, ND), Bill Malaski (Strasburg, ND), and Tara Mertz-Hack (Ellendale, ND)

**2023 Host Facilitator**  
Brian Tande (Overall Chair), Dean, UND College of Engineering and Mines

*The North Dakota State Science & Engineering Fair is operated by the NDSSEF Board. All inquiries regarding the Fair, its judging, and its rules should be directed to the NDSSEF Board.*

**Acknowledgements**  
The North Dakota State Science & Engineering Fair would like to thank all sponsors, UND faculty and staff, graduate students, and engineering student ambassadors for their tremendous support in making this year’s Science & Engineering Fair a success. Your enthusiastic involvement is greatly appreciated.
72ND NORTH DAKOTA STATE SCIENCE & ENGINEERING FAIR

Hosted by the University of North Dakota

SCHEDULE

Thursday, March 30, 2023

8:00-11:00am Registration and Setup
   Main Ballroom, Second floor, Memorial Union
11-12:45pm Lunch on your own
1:00pm Gather in Main Ballroom 214 A-D
1-3:30pm Hands-on activities, Teacher's chaperone students
4:00pm Students meet at Memorial Union Main Ballroom /Dismiss
5-7:30pm Northern Air Family Fun Center (1600 32nd Ave South, Grand Forks)

Friday, March 31, 2023

8:00am Judges Report/Breakfast
   Memorial Union, Second Floor, Small Ballroom (Room 220)
8:30am Judges' Meeting
   Memorial Union, Second Floor, Small Ballroom (Room 220)
9:00am Judging Begins
9:00am Teachers' Meeting
   Memorial Union, Third Floor, Room 340
11:30-1:00pm Students’ Lunch (2 separate groups: 11:00am Juniors; 12:00pm Seniors)
   Memorial Union, First Floor, Food Court ($11 cards provided) *Time is subject to change
12-1:00pm Judges’ Lunch
   Memorial Union, Second Floor, Small Ballroom (Room 220)
12:45pm Judges’ Meeting (All Afternoon Judges)
   Memorial Union, Second Floor, Small Ballroom (Room 220)
1:00pm Judging Resumes
3:30-4:30pm Open to the public
4:30pm Takedown and setup for Awards Ceremony, time is determined by the judges.
   Memorial Union, Second Floor, Main Ballroom (Room 214 A-D)
5:30pm Awards Ceremony*
   Memorial Union, Second Floor, Main Ballroom (Room 214 A-D)

*Following Awards Ceremony: ISEF winners meet with Peter Sykora at the UND Memorial Union Main Ballroom Room 214 A-D.
NORTHWEST REGIONAL INSTRUCTORS

Deb Moe
Tioga High School
PO Box 239
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Victoria Chambers
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West Fargo, ND 58078
FargoVictoria@gmail.com
# NORTHWEST (1) JUNIOR DIVISION

Director: Deb Moe

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
<th>School</th>
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</thead>
<tbody>
<tr>
<td>101</td>
<td>Tyler Asprey</td>
<td>How To Make An Aircraft Invisible To Radar</td>
<td>Williston JH</td>
</tr>
<tr>
<td>102</td>
<td>Nikolai Astvatsaturov</td>
<td>Lets Roll: The Speed Of Marbles On Different Tracks</td>
<td>Williston JH</td>
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<tr>
<td>103</td>
<td>Nevaeh Barten</td>
<td>Mooving From Milk To Plastic.... Udderly Amazing</td>
<td>Williston JH</td>
</tr>
<tr>
<td>104</td>
<td>Isaac Bear</td>
<td>Mousetrap Car</td>
<td>Williston JH</td>
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<tr>
<td>105</td>
<td>Kyle Clinkenbeard</td>
<td>Rainbow Fire</td>
<td>Williston JH</td>
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<tr>
<td>106</td>
<td>Dwayne Declaro</td>
<td>Heat Race Of Metals</td>
<td>Tioga</td>
</tr>
<tr>
<td>107</td>
<td>Abagail Ferguson</td>
<td>The Power Of Grazing</td>
<td>Tioga</td>
</tr>
<tr>
<td>108</td>
<td>Macie Fugate</td>
<td>Getting Started</td>
<td>East Fairview</td>
</tr>
<tr>
<td>109</td>
<td>Malory Garcia</td>
<td>Solar Eclipse</td>
<td>Tioga</td>
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<tr>
<td>110</td>
<td>Landon Goudreau</td>
<td>Can Foil Reflect Indirect Heat</td>
<td>ASB</td>
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<tr>
<td>111</td>
<td>Katelynn Hanig</td>
<td>What Type Of Seeds Do Birds Prefer?</td>
<td>Williston JH</td>
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<tr>
<td>112</td>
<td>Caleb Mosley</td>
<td>Gyroscope Behavior</td>
<td>ASB</td>
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<tr>
<td>113</td>
<td>Gracie Melberg</td>
<td>Dandelions &amp; Their Health Benefits</td>
<td>Tioga</td>
</tr>
<tr>
<td>114</td>
<td>Marlene Perez</td>
<td>Oil Spill Prototype C.A.B.S.</td>
<td>ASB</td>
</tr>
<tr>
<td>115</td>
<td>Leah Placek</td>
<td>Play-Dough? Is It Worth Your Money?</td>
<td>Tioga</td>
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<tr>
<td>116</td>
<td>Ty Poulsen</td>
<td>Wasteful Wipes</td>
<td>East Fairview</td>
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<td>117</td>
<td>Averi Riedel</td>
<td>All Tied Up</td>
<td>East Fairview</td>
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<td>118</td>
<td>Jake Schothauer</td>
<td>Sud Studies</td>
<td>East Fairview</td>
</tr>
<tr>
<td>119</td>
<td>Kiya Sparks</td>
<td>Environmental Influences On Worms &amp; Compost</td>
<td>Tioga</td>
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<tr>
<td>120</td>
<td>Natalia West</td>
<td>How Different Colored Light Affects Plant Growth</td>
<td>Tioga</td>
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## Alternates

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
<th>School</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Mercedes Travis</td>
<td>Does Toothpaste Kill The BActeria In Your Mouth?</td>
<td>Tioga</td>
</tr>
<tr>
<td>2</td>
<td>MacKenzie Locken</td>
<td>Guinea Pigs In Training</td>
<td>Missouri Ridge</td>
</tr>
<tr>
<td>3</td>
<td>Mia Estevez</td>
<td>Elephant Toothpaste</td>
<td>Williston JH</td>
</tr>
<tr>
<td>4</td>
<td>Atley Pagel</td>
<td>Gamer Vs Non-Gamer Reaction Times</td>
<td>Tioga</td>
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</tbody>
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# NORTHEAST (2) JUNIOR DIVISION
Director: Lorraine O’Shea

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>121</td>
<td>Amaa Wijetunga</td>
<td>FilteriCoffee Grounds For Construction</td>
<td>South Middle School</td>
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<tr>
<td>122</td>
<td>Milla Fagerholt &amp; Gianna Hall</td>
<td>Hidden Hazards</td>
<td>Valley /Edinburg Middle School</td>
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<tr>
<td>123</td>
<td>Harrison Mathre</td>
<td>Frozone</td>
<td>Schroeder Middle School</td>
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<tr>
<td>124</td>
<td>Emma Howard</td>
<td>Buzz Lightglow</td>
<td>Schroeder Middle School</td>
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<tr>
<td>125</td>
<td>Aubree Gloe</td>
<td>Sky High</td>
<td>Schroeder Middle School</td>
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<tr>
<td>126</td>
<td>Eliot Miller</td>
<td>Water's Effect on Resistance</td>
<td>Schroeder Middle School</td>
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<td>127</td>
<td>Sean Oncel</td>
<td>Power of Colors</td>
<td>Schroeder Middle School</td>
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<tr>
<td>128</td>
<td>Maxwell Glaser</td>
<td>Polar Permafrost</td>
<td>Schroeder Middle School</td>
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<tr>
<td>129</td>
<td>Che Yu</td>
<td>Self-driving car made from Raspberry Pi with 360 degrees Lidar sensing</td>
<td>South Middle School</td>
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<tr>
<td>130</td>
<td>Austin Ulrich</td>
<td>Smelly Beans</td>
<td>Schroeder Middle School</td>
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<tr>
<td>131</td>
<td>Wyatt Larson</td>
<td>Beat the Heat</td>
<td>Schroeder Middle School</td>
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<tr>
<td>132</td>
<td>Kendal Johnson</td>
<td>Lightning McAge</td>
<td>Schroeder Middle School</td>
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<tr>
<td>133</td>
<td>Layton Pribula &amp; Blake Solberg</td>
<td>Riding the Waves</td>
<td>Schroeder Middle School</td>
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<tr>
<td>134</td>
<td>Micah Jorgenson</td>
<td>Flight Plan</td>
<td>Schroeder Middle School</td>
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<td>135</td>
<td>Nymah Farid</td>
<td>Tappy Plants</td>
<td>Schroeder Middle School</td>
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<td>136</td>
<td>Victoria Owens</td>
<td>Krazy Crystals</td>
<td>Schroeder Middle School</td>
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<td>137</td>
<td>Aerin Salgado &amp; Kenai Auch</td>
<td>It's Electric!</td>
<td>Schroeder Middle School</td>
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<td>138</td>
<td>Boe Joohson &amp; Liam Wadlow</td>
<td>Did it Deflate</td>
<td>Schroeder Middle School</td>
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<td>139</td>
<td>Ella Lizakowski</td>
<td>Green Grass</td>
<td>Schroeder Middle School</td>
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<td>140</td>
<td>Kylie Pierce &amp; Jillian Swanson</td>
<td>Snooze Fest</td>
<td>Schroeder Middle School</td>
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</table>

**Alternates**

<table>
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<tbody>
<tr>
<td>1</td>
<td>Scarlet Dreger &amp; Ingrid Myrdal</td>
<td>Seeds vs Salt</td>
<td>Valley /Edinburg Middle School</td>
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<td>2</td>
<td>Jakob Kehrwald</td>
<td>Emotions in Chess Openings</td>
<td>Schroeder Middle School</td>
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</tbody>
</table>
# SOUTHWEST CENTRAL (3) JUNIOR DIVISION

Director: Erica Larson

<table>
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<tr>
<th>#</th>
<th>Name</th>
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<tbody>
<tr>
<td>141</td>
<td>Tahj Thomas</td>
<td>Mask Efficiency</td>
<td>Glen Ullin</td>
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<tr>
<td>142</td>
<td>Cassy Hartman</td>
<td>Effect Of Starter Fertilization On North Dakota Crops</td>
<td>Flasher</td>
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<td>143</td>
<td>Ryenn Mead</td>
<td>Sugar Spikes</td>
<td>Grant County</td>
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<td>144</td>
<td>Kiley Mausehund</td>
<td>Absence Of Color Affecting Taste</td>
<td>Scranton</td>
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<td>145</td>
<td>Alexander Evans</td>
<td>Comparing The Cost Efficiency Of Incandescent And LED Lightbulbs</td>
<td>Scranton</td>
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<td>146</td>
<td>Carrie LaDuke</td>
<td>The Effect Of Disinfectant Wipes On Bacteria</td>
<td>Flasher</td>
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<td>147</td>
<td>Keegan Roehrich</td>
<td>Going Green As You Clean</td>
<td>Linton</td>
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<td>148</td>
<td>Brenna Eckroth</td>
<td>An Analysis Of Toothpaste Efficacy Using Potable Solution Part II</td>
<td>Flasher</td>
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<td>149</td>
<td>Ghieanaliyah Ayuyu</td>
<td>Workout Affects On CO2</td>
<td>Dickinson</td>
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<td>150</td>
<td>Madalyn Bohl</td>
<td>Effect Of Acid Rain On Seed Germination</td>
<td>Flasher</td>
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<td>151</td>
<td>Layla Krinke</td>
<td>The Public Knowledge Of Egg Labeling</td>
<td>Scranton</td>
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<td>152</td>
<td>Payton Omlid</td>
<td>Musical Plants?!</td>
<td>Flasher</td>
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<tr>
<td>153</td>
<td>Madison Hayden</td>
<td>How Change In Music Genre Affects Heart Rate</td>
<td>Dickinson</td>
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<tr>
<td>154</td>
<td>Brooklyn Hepper</td>
<td>Deflection In Various Bridge Types</td>
<td>Flasher</td>
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<tr>
<td>155</td>
<td>Chloe Maychrzak</td>
<td>Smelling The Difference Between Real &amp; Artificial Smells</td>
<td>Scranton</td>
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<tr>
<td>156</td>
<td>Romana Eaton</td>
<td>Family Resemprints</td>
<td>Scranton</td>
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<td>157</td>
<td>Olivia Lauf</td>
<td>Does Eye Pigment Affect Peripheral Vision?</td>
<td>Dickinson</td>
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<td>158</td>
<td>Jocelyn Zingg</td>
<td>Beneficial Biogas</td>
<td>Flasher</td>
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<td>159</td>
<td>Ava Hauck</td>
<td>Got Shades?</td>
<td>Dickinson</td>
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<tr>
<td>160</td>
<td>Taelyn Boldt</td>
<td>Toxicity In Energy Drinks</td>
<td>Flasher</td>
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**Alternates**

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<tr>
<th>#</th>
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<tbody>
<tr>
<td>1</td>
<td>Jocelyn Rossow</td>
<td>Stains On Fabrics</td>
<td>Flasher</td>
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<tr>
<td>2</td>
<td>Jordan Meyer</td>
<td>Spiffy Clean</td>
<td>Flasher</td>
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<tr>
<td>3</td>
<td>Sam Erhardt</td>
<td>Crazy Corn</td>
<td>Flasher</td>
</tr>
<tr>
<td>4</td>
<td>Piper Schmidt</td>
<td>Dog vs Human Bacteria</td>
<td>Flasher</td>
</tr>
</tbody>
</table>
# SOUTHEAST (4) JUNIOR DIVISION

Director: Patty Kratcha  //  Assistant Director: Tina Pierce

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
<th>School</th>
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<tr>
<td>161</td>
<td>Kaimbryn Sutherland</td>
<td>K9 Top Picks</td>
<td>Kidder County</td>
</tr>
<tr>
<td>162</td>
<td>Alex Jean</td>
<td>Does What You Do Effect Your Hand Strength?</td>
<td>Hankinson Public School</td>
</tr>
<tr>
<td>163</td>
<td>Jenna Rode</td>
<td>Killer Mouthwash</td>
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<tr>
<td>164</td>
<td>Haylee Mauch</td>
<td>To Fertilize or Not to Fertilize...Which Kind is the Question</td>
<td>Hankinson Public School</td>
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<tr>
<td>165</td>
<td>Keegan Isakson</td>
<td>The Danger of Distracted Driving</td>
<td>Kidder County</td>
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<tr>
<td>166</td>
<td>Walker Mogren</td>
<td>What Floats Your Boat?</td>
<td>Lisbon Public School</td>
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<tr>
<td>167</td>
<td>Avery Schoonover</td>
<td>Introvert Vs. Extrovert Who has the Better Memory</td>
<td>Kidder County</td>
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<td>168</td>
<td>Skylar Johnson</td>
<td>How Safe is Your Livestocks' Water?</td>
<td>Lisbon Public School</td>
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<tr>
<td>169</td>
<td>Evelyn Chambers</td>
<td>Generative AI: Can It Fool the Human Senses?</td>
<td>Woodhaven Academy</td>
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<td>170</td>
<td>Dagen Bevre</td>
<td>Habits that Contribute to Dirty Sweat</td>
<td>Hankinson Public School</td>
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<tr>
<td>171</td>
<td>Avra Frolek</td>
<td>Oxygen Overload</td>
<td>Lidgerwood Public School</td>
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<td>172</td>
<td>Henry VonBank</td>
<td>Nautical Nonsense</td>
<td>Hankinson Public School</td>
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<td>173</td>
<td>Landon Eichele</td>
<td>Turn On The Cartoons!</td>
<td>Kidder County</td>
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<td>174</td>
<td>Kamden Spinks</td>
<td>The Effects of Various Liquids on the Growth of Flowers</td>
<td>Hankinson Public School</td>
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<td>175</td>
<td>Lucas Rauda</td>
<td>Which piece should you be packing?</td>
<td>Kidder County</td>
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<tr>
<td>176</td>
<td>Amla Prochnow</td>
<td>The Application of Citrus Extract as an Antimicrobial Alternative</td>
<td>Hankinson Public School</td>
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<tr>
<td>177</td>
<td>Avery Mosset</td>
<td>Cheap vs. Expensive</td>
<td>Kidder County</td>
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<tr>
<td>178</td>
<td>Nolan Sutherland</td>
<td>How Effective is Subliminal Messaging?</td>
<td>Lisbon Public School</td>
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<td>179</td>
<td>Adeline Stenvold</td>
<td>Waterproof Fabric</td>
<td>Lidgerwood Public School</td>
</tr>
<tr>
<td>180</td>
<td>Elliana Nicholson</td>
<td>Got It in the Bag?</td>
<td>Kidder County</td>
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## Alternates

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
<th>School</th>
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<tbody>
<tr>
<td>1</td>
<td>Brody Schoenhard</td>
<td>Can you handle the pressure?</td>
<td>Kidder County</td>
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<tr>
<td>2</td>
<td>Ava Siemieniewski</td>
<td>Germs Be Gone</td>
<td>Lidgerwood Public School</td>
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<tr>
<td>3</td>
<td>Ian Lien</td>
<td>Mousetrap Car</td>
<td>Montpelier High School</td>
</tr>
<tr>
<td>4</td>
<td>Quincy Welder</td>
<td>Velo Hero</td>
<td>Kidder County</td>
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# NORTHWEST (1) SENIOR DIVISION
Director: Deb Moe

## Projects

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>201</td>
<td>Hailey Asselin</td>
<td>Cafeteria Bacteria</td>
<td>Trenton</td>
</tr>
<tr>
<td>202</td>
<td>Emily Dickinson</td>
<td>Do They Really Work?</td>
<td>Tioga</td>
</tr>
<tr>
<td>203</td>
<td>Josie Fernholz</td>
<td>Agriculture On Earth vs The Moon</td>
<td>Trenton</td>
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<tr>
<td>204</td>
<td>Abigail Hoyt</td>
<td>What Form Of Vitamin Is The Best?</td>
<td>Trenton</td>
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<tr>
<td>205</td>
<td>Cheryl Hayes</td>
<td>Hand Sanitizer Effectiveness</td>
<td>Tioga</td>
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<tr>
<td>206</td>
<td>Jerrad Tyler Hiatt</td>
<td>What Types Of Wood Burn Hotter</td>
<td>Tioga</td>
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<tr>
<td>207</td>
<td>Kenadi Houle</td>
<td>Lets Talk Germs</td>
<td>Trenton</td>
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<tr>
<td>208</td>
<td>Karlee Hoyt</td>
<td>Water Daphnia Vs. Marine Pollutants</td>
<td>Trenton</td>
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<td>209</td>
<td>Madison Mock</td>
<td>Brand Vs. Natural</td>
<td>Trenton</td>
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<td>210</td>
<td>Aletta Nelson</td>
<td>Does Your Dominance Affect Your Range?</td>
<td>Tioga</td>
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<td>211</td>
<td>Gracie Nutt</td>
<td>Paramount Power Plow</td>
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<td>212</td>
<td>Aallyha Lara</td>
<td>Memory Recall: Female Vs. Male</td>
<td>Tioga</td>
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<td>213</td>
<td>Riley Pederson</td>
<td>The Swamp Monster</td>
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<td>214</td>
<td>Brianna Rose</td>
<td>Wash Your Hands!</td>
<td>Tioga</td>
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<td>215</td>
<td>Xzander Schwartz</td>
<td>Magnetic Suspension</td>
<td>Trenton</td>
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<tr>
<td>216</td>
<td>Bilee Sunhagen</td>
<td>The Colors Of Optical Illusions</td>
<td>Tioga</td>
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<tr>
<td>217</td>
<td>Emma Taylor</td>
<td>Are Food Handler Gloves Really Beneficial?</td>
<td>Tioga</td>
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<tr>
<td>218</td>
<td>Jada Turcotte</td>
<td>Sporty Bacteria</td>
<td>Trenton</td>
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<tr>
<td>219</td>
<td>Brooke Vachal</td>
<td>Cattle Weaning</td>
<td>Tioga</td>
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<tr>
<td>220</td>
<td>Camara Scero</td>
<td>Bacteria In The Bakken</td>
<td>Trenton</td>
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## Alternates

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>1</td>
<td>Claire Lakey</td>
<td>The Stroop Effect: How Fast Can Your Brain Go?</td>
<td>Tioga</td>
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<tr>
<td>2</td>
<td>Max Slater</td>
<td>How Music Affects Free Throw Shooting</td>
<td>Trenton</td>
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# NORTHEAST (2) SENIOR DIVISION

Director: Lorraine O’Shea

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<tr>
<th>#</th>
<th>Name</th>
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<tbody>
<tr>
<td>221</td>
<td>Elizabeth Fedje &amp; Brooke Gullickson</td>
<td>The Path to Preventing Blue-Green Algae Growth in North Dakota Watersheds</td>
<td>Valley /Edinburg High School</td>
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<tr>
<td>222</td>
<td>Nivanthi Wijetunga</td>
<td>Immediate effects of physical exercise on respiratory and circulatory systems</td>
<td>Red River High School</td>
</tr>
<tr>
<td>223</td>
<td>Sudiksha Singhal</td>
<td>A Study of the Thermal Properties of Tissue and Fecal Matter to Investigate Potential Biomedical Applications of Thermography with a Focus on IBD</td>
<td>Red River High School</td>
</tr>
<tr>
<td>224</td>
<td>Malory Kemp</td>
<td>Sustainable Solutions - Comparing Electrochemical vs Traditional Methods of Wastewater Remediation</td>
<td>Cavalier High School</td>
</tr>
<tr>
<td>225</td>
<td>Halle Kohlmeier, Jacie Reardon &amp; Adrianna Tande</td>
<td>This is So Lit!</td>
<td>Central High School</td>
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## Alternates

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## SOUTHWEST CENTRAL (3) SENIOR DIVISION
Director: Erica Larson

<table>
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<th>Name</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>241</td>
<td>Cody Bahm</td>
<td>Bullet Destruction</td>
<td>Flasher</td>
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<tr>
<td>242</td>
<td>Hayden Fischer</td>
<td>How Much Weight Does It Take To Drop A Maglev Train?</td>
<td>Flasher</td>
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<tr>
<td>243</td>
<td>Sophia Jochim</td>
<td>Determining The Yield Difference Between Hybrids Of Corn</td>
<td>Scranton</td>
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<tr>
<td>244</td>
<td>Landon Eaton</td>
<td>Conception Rate in Cattle As Affected By Grade Of Transplanted In Vitro Fertilization Embryos</td>
<td>Flasher</td>
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<tr>
<td>245</td>
<td>Summer Fleck</td>
<td>An Analysis Of Bodily Homeostasis As Affected By Ingested pH</td>
<td>Flasher</td>
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<tr>
<td>246</td>
<td>Skye Weinberger</td>
<td>Sanitation Rate Of UVC Light On CPAP Apparatus</td>
<td>Flasher</td>
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<tr>
<td>247</td>
<td>Dani Maychrzak</td>
<td>Testing Different Types Of Cattle Bedding To Determine Which Has The Least Amount Of Bacterial Growth</td>
<td>Scranton</td>
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<tr>
<td>248</td>
<td>Chaskee Schmidt</td>
<td>An Analysis Of Water Source Quality As Affected By Bacteria Introduced Through Carcass Decomposition</td>
<td>Flasher</td>
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<tr>
<td>249</td>
<td>James Gessey</td>
<td>Is It Worse Than Nicotine</td>
<td>Flasher</td>
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<td>250</td>
<td>Chason Schumacher</td>
<td>Difference In strengths of Warren, Howe, And The Tri-Bearing Truss And Rafter Designs</td>
<td>Scranton</td>
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<tr>
<td>251</td>
<td>Paige Zenker</td>
<td>Wheat Germination</td>
<td>Flasher</td>
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<td>252</td>
<td>Karady Evans</td>
<td>Difference Between Teaching Different Types Of Kinesthetic Lessons To Elementary Aged Students, While Teaching Ag In The Classroom</td>
<td>Scranton</td>
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<td>253</td>
<td>Jada Bonogofsky</td>
<td>Antimicrobial Resistance Of A Biofilm-Forming Pathogen Probed With Antipyretic Pharmaceuticals And Antibiotics</td>
<td>Flasher</td>
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<td>254</td>
<td>Alyssa Froelich</td>
<td>Propagating Plants Utilizing Natural Fertilizers</td>
<td>Flasher</td>
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<td>255</td>
<td>Daci Wells</td>
<td>Welding UV Radiation In Accordance With The Law Of Reflection</td>
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<td>256</td>
<td>Kaitlyn Hauge</td>
<td>Mask Efficacy</td>
<td>Flasher</td>
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<td>257</td>
<td>Grant Hauge</td>
<td>An Analysis Of Nitrates In Sorghum, Based On Moisture And Timing</td>
<td>Flasher</td>
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<td>258</td>
<td>Eden Steckler</td>
<td>How Does pH Affect Sea Urchin Development?</td>
<td>School Of The Holy Family</td>
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### Alternates

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<tr>
<td>1</td>
<td>Mykenzie Winkler</td>
<td>Stressed Out?</td>
<td>Grant County</td>
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<td>2</td>
<td>Victoria Richter</td>
<td>Think Ink</td>
<td>Flasher</td>
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<tr>
<td>3</td>
<td>Summer Meyer &amp; Bree Rivinius</td>
<td>Protecting Produce</td>
<td>Grant County</td>
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<td>4</td>
<td>Taylor Zenker</td>
<td>Synthetic vs. Natural</td>
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## SOUTHEAST (4) SENIOR DIVISION

Director: Patty Kracha    //   Assistant Director: Tina Pierce

<table>
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<th>Name</th>
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<tr>
<td>261</td>
<td>Cianna Fanta</td>
<td>To Grow or Not to Grow</td>
<td>Kidder County</td>
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<td>262</td>
<td>Gavin Kratcha</td>
<td>Sustainable Hydroponic Production Using Automated Agricultural Nutrient Reclamation</td>
<td>Hankinson Public School</td>
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<tr>
<td>263</td>
<td>Isaiah Gerald</td>
<td>Chemiluminescence</td>
<td>Montpelier High School</td>
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<tr>
<td>264</td>
<td>Kolby Sheggerud</td>
<td>Dry Those Germs Away</td>
<td>Hankinson Public School</td>
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<tr>
<td>265</td>
<td>Cora Oster</td>
<td>Does Water Temperature Affect Bacteria Colonization</td>
<td>Lisbon Public School</td>
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<tr>
<td>266</td>
<td>Karsyn Bladow</td>
<td>Which Water Bottle is Best at Keeping Water Hot or Cold? Does it Matter?</td>
<td>Hankinson Public School</td>
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<tr>
<td>267</td>
<td>Addison Salzwedel</td>
<td>Comparison of Water Quality Before and After Treatment</td>
<td>Lisbon Public School</td>
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<td>268</td>
<td>Kardelen Hanson</td>
<td>Examining the Effects of Media-Related Confirmation Bias on Adults</td>
<td>Hankinson Public School</td>
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<td>269</td>
<td>Patrick Shen</td>
<td>Do Single-Cell Hi-C Data Follow a Power-law Decay?</td>
<td>Davies High School</td>
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<tr>
<td>270</td>
<td>Olivia Koehler</td>
<td>Does Chewing Gum Impact the Bacteria In Your Mouth?</td>
<td>Hankinson Public School</td>
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<tr>
<td>271</td>
<td>Brayden Sutherland</td>
<td>A Study on the Relationship Between Retention and Work Ethic</td>
<td>Lisbon Public School</td>
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<tr>
<td>272</td>
<td>Kenadi David</td>
<td>Brush Up!</td>
<td>Hankinson Public School</td>
</tr>
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<td>273</td>
<td>Lillian Mittleider</td>
<td>The Effects of Distracted Driving</td>
<td>Kidder County</td>
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<td>274</td>
<td>Elise Elliot</td>
<td>Analysis of Topsoil Erosion Prevention</td>
<td>Hankinson Public School</td>
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<td>275</td>
<td>Lyla Gillespie</td>
<td>Which Sunscreen is Most Effective</td>
<td>Lisbon Public School</td>
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<td>276</td>
<td>Adrianna Krump</td>
<td>Decaying Potential of Different Liquids</td>
<td>Hankinson Public School</td>
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<td>277</td>
<td>Shawna Nix</td>
<td>aging effects of wheat germination</td>
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<td>278</td>
<td>Denver Nelson</td>
<td>Storing Your Fruit the Right Way</td>
<td>Hankinson Public School</td>
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<td>279</td>
<td>Hailey Qual</td>
<td>A Comparison of Bacterial Colonization on Animal Based Proteins versus Plant Based Proteins</td>
<td>Lisbon Public School</td>
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<tr>
<td>280</td>
<td>Trey Silbernagel</td>
<td>Caution! Icy Roads</td>
<td>Kidder County</td>
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### Alternates

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<th>Name</th>
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NORTH DAKOTA STATE SCIENCE & ENGINEERING FAIR AWARDS: JUNIOR DIVISION

At the North Dakota State Science & Engineering Fair, five junior division students from each of the four regions are selected to receive special recognition. Three are selected as second-place winners, and two are selected as first-place winners. In addition, one presenter is selected as the junior division runner-up, sweepstakes award winner and one as the junior division sweepstakes winner. Awards are as follows:

- Second-place winners: each second-place winner receives a silver plaque.
- First-place winners: each first-place winner receives a gold plaque.
- Runner-up sweepstakes winner: the runner-up sweepstakes winner is judged as presenting the second-best junior division project from all regions and from any discipline category, and receives a silver North Dakota plaque and a monetary award of $100 from ND IDeA Network of Biomedical Research Excellence.
- Sweepstakes winner: the sweepstakes winner is judged as presenting the best junior division project from all regions and from any discipline category. The sweepstakes winner receives a gold North Dakota plaque, and a monetary award of $150 from ND IDeA Network of Biomedical Research Excellence.

NORTH DAKOTA STATE SCIENCE & ENGINEERING FAIR AWARDS: SENIOR DIVISION

From among the students presenting projects in the senior division: In the Northwest Region, six students will be selected to receive special recognition (three will be selected as second-place winners and three will be selected as first-place winners). In the Northeast Region, four students will be selected to receive special recognition (three will be selected as second-place winners and one will be selected as a first-place winner). In the Southwest Central Region, five students will be selected to receive special recognition (three will be selected as second place winners and two will be selected as first-place winners). In the Southeast Region, six students will be selected to receive special recognition (three will be selected as second place winners and three will be selected as first place winners). In addition, one student is selected as presenting an outstanding project from among all regions and category disciplines, and receives the senior division sweepstakes second runner-up award, a second student is selected as presenting an outstanding project from among all regions and category disciplines and receives the sweepstakes runner-up award. The student who presents the best project from among all regions and category disciplines in the senior division is named the senior division sweepstakes winner. Awards are as follows:

- Second-place winners: the 12 second-place winners receive a silver plaque, and they are named as alternates to attend the International Science and Engineering Fair (ISEF) in Dallas, TX in May 2023.
- First-place winners: the 9 first-place winners receive a gold plaque and a hooded sweatshirt. They also compete as North Dakota representatives at the ISEF in Dallas, TX.
- Sweepstakes Second Runner-Up: The Sweepstakes Second Runner-Up is judged as representing the third-best senior division project from all regions and from any discipline category. In addition to competing at ISEF, the winner receives a hooded sweatshirt, a North Dakota plaque, a monetary award of $200, and a one-year, $1,000 scholarship from UND College of Engineering and Mines.
- Sweepstakes Runner-Up: The Sweepstakes Runner-Up is judged as representing the second best-senior division project from all regions and from any discipline category. In addition to competing at ISEF, the winner receives a hooded sweatshirt, a silver North Dakota plaque, a one-year, $2,000 scholarship to the University of North Dakota, plus a monetary award of $250 from the UND School of Medicine & Health Sciences.
- Sweepstakes Winner: The Sweepstakes Winner is judged as presenting the best senior division project from all regions and from any discipline category. In addition to competing at ISEF, the winner receives a hooded sweatshirt, a gold North Dakota plaque, a one-year, $2,500 scholarship to UND, plus a monetary award of $500 from the UND College of Arts & Sciences, and a monetary award of $200 from the Marcus J. Friskop Family.
- Marcus J. Friskop Traveling Trophy; the sweepstakes winner’s school receives the Marcus J. Friskop Traveling Trophy. Marcus was a longtime supporter of science education and his visions greatly impact science fairs in North Dakota.
UNIVERSITY OF NORTH DAKOTA AWARDS

John D. Odegard School of Aerospace Sciences

Department of Atmospheric Sciences
$100 monetary award and a certificate for project in Atmospheric Sciences, Junior or Senior division

College of Arts & Sciences

Department of Biology
• $100 monetary award, $500 UND Biology Scholarship, certificate for project in Biology, Senior division
• $50 monetary award and a certificate for project in Biology, Junior division

Department of Chemistry
• $100 monetary award and certificate for project in Chemistry, Senior division
• $50 monetary award and certificate for project in Chemistry, Junior division

Department of Geography
• $75 monetary award and a certificate for project the Geography, Senior division
• $75 monetary award and a certificate for project in Geography, Junior division
• $75 monetary award and a certificate for project the Atmospheric Sciences and Environmental Sciences, Senior division
• $75 monetary award and a certificate for project in Earth Sciences, Junior division

Department of Mathematics
• $100 monetary award, $500 UND Math scholarship, and a certificate for project in the Mathematics, Senior division
• $50 monetary award and certificate for project in Mathematics, Junior division

Department of Physics & Astrophysics
• $100 monetary award, $500 UND Physics scholarship, and a certificate for project in Physics, Senior division
• $100 monetary award and a certificate for best project in Physics, Junior division

Department of Psychology
• $100 monetary award and a certificate for project in Psychology or Behavioral Science, Senior division: 2 winners, Monetary Award of $100 each
• $100 monetary award and a certificate for project in Psychology or Behavioral Science, Junior division: 2 winners, Monetary Award of $100 each

Virginia George Inheritance Fund
• $50 monetary award for project in Social or Behavioral Science, Senior division
• $25 monetary award for project in Social or Behavioral Science, Junior division

College of Engineering & Mines

• $500 scholarship plus $100 monetary award for project in Engineering (female winner), Senior division
• $100 monetary award and certificate for project in Engineering, Senior division
• $50 monetary award and certificate for project in Engineering, Junior division
• $100 monetary award and certificate for project in Energy/Environmental Science, Senior division
• $75 monetary award for project in Biomedical engineering, Junior division
• $125 monetary award for project in Biomedical engineering, Senior division

Department of Chemical Engineering
• $50 monetary award and a certificate for project in Chemical Engineering, Senior division
• $50 monetary award and a certificate for project in Chemical Engineering, Junior division

Department of Civil Engineering
• $25 monetary award and a certificate for project in Civil Engineering, Senior division
• $25 monetary award and a certificate for project in Civil Engineering, Junior division

Department of Computer Science
• $100 monetary award and a certificate for project in Computer Science, Senior division
• $100 monetary award and a certificate for project in Computer Science, Junior division

Department of Electrical Engineering
• $50 monetary award and a certificate for project in Electrical Engineering, Senior division
• $50 monetary award and a certificate for project in Electrical Engineering, Junior division

Department of Geology & Geological Engineering
• $100 monetary award and certificate for project in Geology/Geological Engineering, Senior division
• $100 monetary award and certificate for project in Geology/Geological Engineering, Junior division

Department of Mechanical Engineering
• $50 monetary award and a certificate for project in Mechanical Engineering, Senior division
• $50 monetary award and a certificate for project in Mechanical Engineering, Junior division

Department of Petroleum Engineering
• $50 monetary award and a certificate for project in Engineering, Senior division

School of Medicine & Health Sciences
• $300 monetary award, and a certificate for project in Medical or Health Sciences, Senior division
• $150 monetary award, and a certificate for project in Medical or Health Sciences, Senior division
• $300 monetary award, and a certificate for project in Medical or Health Sciences, Junior division

Department of Biomedical Sciences
• $100 monetary award and certificate for project in Pharmacology/Immunology, Senior division
• $100 monetary award and certificate for project in Pharmacology/Immunology, Junior division
• $50 monetary award and certificate for project in Life Sciences (Molecular Biology Emphasis), Senior division, 2 winners
• $50 monetary award and certificate for project in Life Sciences (Molecular Biology Emphasis), Senior division, 2 winners
• $100 monetary award and certificate for project in Microbiology/Infectious Disease, Senior division, 2 winners
• $50 monetary award and certificate for project in Microbiology/Infectious Disease, Junior division, 2 winners
• $100 monetary award and certificate for project in Medical or Health Sciences, Junior division
• $100 monetary award and certificate for project in Medical or Health Sciences, Senior division

All awards are subject to change.
OTHER ORGANIZATIONS, SOCIETIES & AGENCIES SPONSORING AWARDS

American Chemical Society, Red River Valley Section
- $100 Barnes and Noble Gift Card, A Periodic Table Scroll Pen, and a certificate, for best project in chemistry, Junior division
- $100 Barnes and Noble Gift Card, A Periodic Table Scroll Pen, and a certificate, for best project in chemistry, Senior division

American Psychological Association
- A certificate for project related to Psychology, Senior or Junior division

American Society for Clinical Laboratory Science – North Dakota
- $50 monetary award and a certificate for project related to laboratory medicine, Senior division, 3 Winners
- $50 monetary award and a certificate for project related to laboratory medicine, Junior division, 3 Winners

American Water Works Association
- $75 monetary award and a certificate for project related to drinking water quality, Junior and Senior divisions

Association for Women Geoscientists
- A certificate for project related to Geosciences, Senior or Junior division (Must be a female exhibitor)

Auxiliary to the North Dakota Veterinary Medical Association
- $50 monetary award and a certificate for project related to veterinary medicine, Junior division

Farmers Union Insurance–North Dakota
- $50 monetary award and a Certificate for project related to agriculture, Senior division, 2 winners
- $25 monetary award and a certificate for project related to agriculture, Junior division, 2 winners

Hot Cakes Café & Lodging
- $25 monetary award, a t-shirt, and a certificate for project that has emphasis on food quality or food safety, Junior division
- $25 monetary award, a t-shirt, and a certificate for project that has emphasis on food quality or food safety, Senior division

ISEF Alumni
- $200 and a certificate for project determined by ISEF judges, Senior or Junior division
- $100 and a certificate for project determined by ISEF judges, Senior or Junior division

Mu Alpha Theta
- A certificate for project involving modern mathematics, Senior division

NPS Metals a Division of Owen Industries
- $500 monetary award and certificate for project related to Manufacturing, Senior division

National Oceanic & Atmospheric Administration
- A certificate and a medallion for project related to improved understanding of the earth’s processes, Junior division

National Weather Service
- A certificate for project related to Meteorology, Junior and Senior division

North Dakota Academy of Family Physicians
- $50 monetary award and certificate for project related to medicine, Senior division

North Dakota Dental Foundation
- $50 monetary award and a certificate for project related to dentistry, Senior division, 2 winners
- $50 monetary award and a certificate for project related to dentistry, Junior division, 2 winners

North Dakota Farm Bureau
- $25 Monetary award and a Certificate for project related to agriculture, Senior Division, 2 winners
- $25 Monetary award and a Certificate for project related to agriculture, Junior Division, 2 winners

North Dakota Geological Society
- $50 monetary award and a certificate for project in the field of geology or earth science, Junior and Senior divisions

North Dakota Guaranty & Title Co.
- $125 Monetary award and a certificate for project in Computer Science (Emphasis in Artificial Intelligence), Junior and Senior divisions

North Dakota Pharmacists Association
- $100 monetary award and a certificate for project in the field of pharmacology, Senior division
- $75 monetary award and a certificate for project in the field of pharmacology, Junior division

North Dakota Rural Water Systems Association
- $100 monetary award and for project related to water quality, Senior division

North Dakota State Science and Engineering Fair Association
- $50 monetary award and a certificate for project in the Biochemistry category, Senior division
- $50 monetary award and a certificate for project in the Biochemistry category, Junior division
- $50 monetary award and a certificate for project in the Botany category, Senior division
- $50 monetary award and a certificate for project in the Botany category, Junior division
- $50 monetary award and a certificate for project in the Environmental Science (pollution related) category, Senior division
- $50 monetary award and a certificate for project in the Environmental Science (pollution related) category, Junior division

North Dakota Veterinary Medical Association
- $300 monetary award and a certificate for project related to veterinary medicine, Senior division
- $225 monetary award and a certificate for project related to veterinary medicine, Senior division
- $75 monetary award and a certificate for project related to veterinary medicine, Junior division

North Dakota Water Environment Association
- $75 monetary award and certificate for project related to drinking water quality, Senior division
- $75 monetary award and certificate for project related to drinking water quality, Junior division

Ottertail Power Company
- $50 monetary award and a certificate for project related to energy or electricity, Senior division, 3 winners
- $50 monetary award and a certificate for project related to energy or electricity, Junior division, 2 winners
Regeneron Biomedical Science Award
- $375 monetary award and a certificate for project related to biomedical science and research, Senior division

Ricoh Corporation
- A certificate for project related to environmentally friendly businesses, Senior division

Society for In Vitro Biology
- A certificate for project in the area of tissue culture, 11th-grader

Society of Automotive Engineers
- $125 monetary award and a certificate for best project in mobility engineering, Junior and Senior division

United States Air Force
- An Over-the-Shoulder Sling Pack, Power Bank Charger, Dog Tag USB Flash Drive, a Dual USB Car Charger, and a Certificate for a project that has applications useful to the Air Force, 4 winners, Junior or Senior Division

United States Metric Association
- A certificate for project using metric system for measurements, Junior division, 5 winners

United States Navy
- Educational recognition award valued at $75, a medallion and a certificate for project, all categories considered, Senior division, 2 winners
- A medallion and a certificate for project, all categories considered, Junior division, 2 winners

Water Environment Federation
- A certificate for project related to water quality or water conditions, Junior or Senior division

Xcel Energy
- $25 monetary award and a certificate for project related to energy or electricity, Junior division, 3 winners
- $25 monetary award and a certificate for project related to energy or electricity, Senior division, 3 winners

Yale Science and Engineering Association
- A medallion and a certificate for project in areas of computer science, Senior division

All awards are subject to change.
CAMPUS MAP

View the campus map online at https://und.edu/map/index.html

For information on event and visitor parking, please visit https://campus.und.edu/transportation/parking/event-parking.html

INTERACTIVE MAP

Scan the QR code with your smartphone’s camera to access an interactive map of campus. Or visit UND.edu/map.
THANK YOU!

Thank you to each student for participating in this year’s North Dakota State Science and Engineering Fair! We also thank the parents, teachers, and all those who supported them along the way. For more information about the Fair, photos, videos, awards list, and this book in digital format go to:

UND.edu/ndssef