



# 2025 High School Design Competition

**14 March 2025 | UNBC, Prince George Campus**

- **Competition website:** <https://www.unbc.ca/engineering/high-school-design-competition>
- **Contact:** [Engineering.Outreach@unbc.ca](mailto:Engineering.Outreach@unbc.ca)

Welcome to the annual High School Design Competition, presented by UNBC's School of Engineering! This year's competition poses a thrilling new design challenge, so get ready to design, innovate, and *throw caution to the wind*.

Grade 10-12 high school student teams may compete for fabulous prizes, including UNBC tuition credits, School of Engineering swag, and more!

**Teams must [register here](#) to participate!**

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## Feb. 2025 Updates

Due to safety concerns raised in association with a proposed apparatus design, we are issuing the following updates:

### Rule Amendments

- **The sandbag powering the apparatus cannot exceed 10 kilograms.**
- **Round 2 of the Design Challenge ("Distance") is now scored in relation to a 10-metre maximum distance.** Scoring for Round 2 will still be averaged across the distance of 3 shots. However, if any part of a bean bag passes the 10-metre mark, that shot will be disqualified from the averaged total in that round.

### Rule Reinforcements

- **All designed apparatuses must prioritize safe operation and pose no risk to competition participants, attendees, or property.** Apparatuses must also be free-standing, readily transportable, and able to be reloaded in under 2 minutes.
- **The designed apparatus must fit within the 1m (W) x 1m (D) x 2m (H) size limitations.** All appendages or other elements of the apparatus (including the sandbag) must fit within the projected "box" of these dimensions.
- **The sandbag powering the apparatus cannot trigger a second mechanism and/or second source of energy** (i.e., a spring, counterweight, multiple sandbags).

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## Eligibility

- All students in **Grades 10, 11, and 12** are eligible to participate.
- Teams can be composed of **2-4 students** and mixed grades are allowed.
- Team members may also attend different schools.
- Students who participated in prior Design Competitions are eligible to compete again!

### Student teams must commit to the following:

- ☑ Confirm participation [via registration form](#) (including a team name!).
- ☑ Design apparatus and participate during competition on **14 March 2025**.
- ☑ Provide a brief, 5-minute presentation on team’s design process, alongside [a science fair-style display board](#), and participate in judge Q&A session during the competition.

## Design Challenge

Design an apparatus that can launch bean bags toward a target, in the style of the yard game cornhole. The apparatus must take up **a maximum footprint of 1m (W) x 1m (D) x 2m (H)** and be **powered by a single falling sandbag that does not exceed 10 kgs**. Find [Challenge Specifications](#) below, and any questions about these specifications can be directed to [Engineering.Outreach@unbc.ca](mailto:Engineering.Outreach@unbc.ca).

The design challenge competition will feature **2 Rounds**, plus a third tiebreaker round if needed:

<b>Round 1: Accuracy</b>	Teams will aim for a standard wooden cornhole board and will be scored based on placement of bean bags.
<b>Round 2: Distance</b>	Teams will aim for the furthest distance possible, without exceeding 10 metres.
<b>Tiebreaker</b>	If needed, tied teams will compete in a tiebreaker round.

Teams will also be scored on a presentation and Q&A session with competition judges, as well as the overall costs of the final design. (Access [Competition Scoring & Judging](#) section below.)

## Team Budget & Mentoring

Each team will have a **maximum budget of \$500**, generously provided by our industry sponsors. Details on [accessing funds and submitting reimbursements](#) are provided below.

Throughout the design process, a UNBC Engineering student and industry sponsors will be available to mentor each team. To coordinate student mentor meetings, please contact competition organizers at [Engineering.Outreach@unbc.ca](mailto:Engineering.Outreach@unbc.ca).

## Design Challenge Specifications

**Teams must adhere to the following specifications to qualify for this year's design competition.**

### Apparatus

**All designed apparatuses must prioritize safe operation and pose no risk to competition participants, attendees, or property.**

**The apparatus must:**

- Be free-standing and portable, and able to be reloaded in under 2 minutes
- Be powered only by a falling sandbag\* that weighs no more than 10 kgs maximum
- Fit within a maximum footprint of 1 m (W) x 1 m (D) x 2 m (H). All appendages or other elements of the apparatus (including the sandbag) must fit within the projected "box" of these dimensions.

*\*Note: The sandbag powering the apparatus cannot trigger a second mechanism and/or second source of energy (i.e., a spring, counterweight, multiple sandbags).*

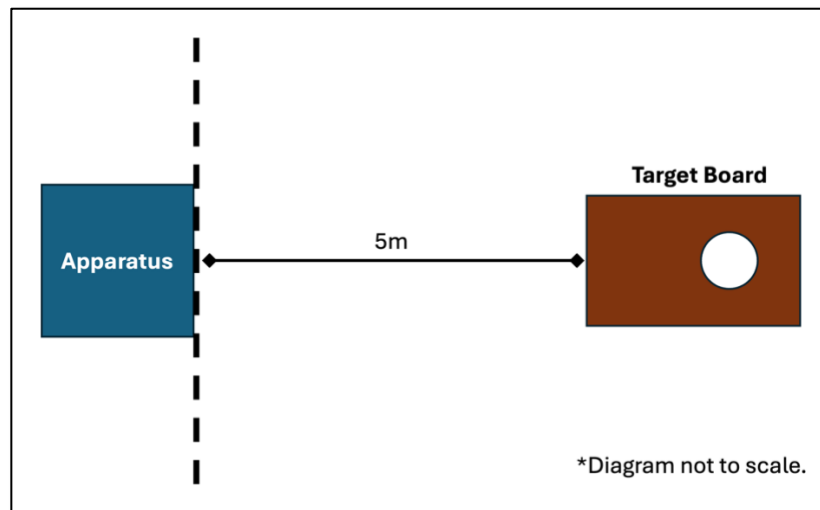
### Bean Bags

The projectiles for the design challenge will be standard cornhole bean bags. The School of Engineering will provide each team with bean bags to use in their design process. The bean bag specifications are as follows:

- **Material:** Canvas
- **Dimensions:** 15.24 cm x 15.24 cm (6 in x 6 in); approx. 3.175 cm (1.25 in) at thickest point
- **Mass:** 454 g (16 ounces)

## Target Board

In [the first competition round](#), teams will launch their projectiles toward a standard wooden cornhole board. As shown in Figure 1, the distance between the launching line and the front of the target board will be **5 metres**.



*Figure 1: Diagram of bean bag competition launching field for Round 1.*

The target board features a smooth-finished surface and standard dimensions as follows:

- **Board:** 1.22 m x .61 m (4 ft x 2 ft), with the bottom raised 10.16 cm (4 in) from the ground and the top raised 30.48 cm (12 in)
- **Target Hole:** 15.24 cm (6 in), centred 22.86 cm (9 in) from top of board

Teams are encouraged to either build, purchase, or use their own boards as they develop their apparatus designs. Sample board plans [can be accessed here](#). The School of Engineering will provide target boards for the competition, and teams may contact [Engineering.Outreach@unbc.ca](mailto:Engineering.Outreach@unbc.ca) to coordinate time to practise with the competition targets.

## Competition Scoring & Judging

Teams will be scored during the competition rounds and in a presentation and Q&A about their design, alongside a science fair-style display board. Overall competition scoring will be distributed across the following categories:

(1) Bean Bag Competition Rounds	70%
(2) Presentation + Q&A Session	20%
(3) Design Cost	10%

## (1) Bean Bag Competition Rounds | 70%

Each competition round will be scored as follows, and the cumulative score across all rounds will determine the winning team for this portion of the competition.

In all rounds, each team has up to 2 minutes per shot to reload and fire their apparatus, or they forfeit the shot. Shots will also be disqualified if any part of the team's apparatus extends past the **1m (W) x 1m (D) x 2m (H)** footprint or the launching line. The launch field will be cleared after a team's points are tallied in each round. (**Note:** Unlike the yard game, teams will **not** alternate turns when launching bean bags in any round.)

### **Round 1: Accuracy**

Each team will launch **5 bean bags in sequence**, aiming for the target board 5 metres away (as shown in Figure 1). Teams will be awarded points after all 5 bean bags have been launched, as follows:

- **1 point** for each bean bag that remains on the board
- **3 points** for each bean bag that passes through the board hole

**Teams must meet the following conditions to qualify for points in Round 1:**

- Points will be tallied only after all 5 bean bags have been launched, meaning a team may knock its own bags into the target hole and/or off the board.
- Bean bags must first land on the target board to be awarded any points; bags may not first strike the ground and then roll/tumble onto the board to be eligible for points (*including through-the-hole points*).
- Points will be awarded for bean bags that land on the target board but then slide down the front to make contact with the ground, provided that a part of the bag remains on the board surface; otherwise, no part of a bean bag may be in contact with the ground to be eligible for on-the-board points (*i.e., by landing where the bottom of the board meets the ground*).

### **Round 2: Distance**

Each team will launch **3 bean bags in sequence**, aiming for the furthest distance possible without exceeding 10 metres. If any part of a bean bag passes the 10-metre mark, that shot will be disqualified from the round. The distances will be measured straight from the launching line to the far side of each bean bag, rounded to the closest decimal point (e.g., 8.8 m). Bags may be “pushed” by a team's subsequent launches, though each bag will still be measured individually.

Teams will then be awarded points after all 3 bean bags have been launched, as follows:

- **Points will be awarded based on the average of the 3 shots in Round 2** (*i.e., the sum of the 3 distances, divided by 3*), rounded to the closest decimal point (*i.e., an average of 9.2 m will be awarded 9.2 points in Round 2*). If any part of a bean bag passes the 10-metre mark, that shot will be omitted from the averaged total.

### **Tiebreaker Round**

If 2 or more teams are tied between first and third places after both competition rounds, a tiebreaker round will take place. The tiebreaker challenge will be as follows:

- Tied teams will alternatively launch single bean bags at the target board at a distance of **6 metres**. Whichever team first passes a bag through the board hole will be the victors. (*Any bags on the board will be removed between shots.*) Tied teams will flip a coin to determine who will launch first.

## (2) Presentation + Q&A Session | 20%

On the competition day, student teams will be asked to engage with a panel of competition judges by participating in a **brief, 5-minute presentation** about their design process, alongside [a science fair-style display board](#), and a **Q&A session**.

Competition judges will be made up of industry sponsors and School of Engineering faculty and/or students. Audience members may also ask questions during the Q&A session. Judges will assess the presentation and Q&A session according to team's ability to provide a clear, concise summary of their design process, and the team's proficiency in justifying technical decisions made within that process.

Teams are encouraged to coordinate on attire, the design of their display board, and any decorations of their apparatus to provide a cohesive and memorable representation of their team dynamic.

**The team's display board should include, but is not limited to, the following:**

- ☑ **Team name**, as well as individual student names, teacher, mentor(s), and school being represented
- ☑ **An overview** section summarizing goals, materials, and final design
- ☑ **Background** detailing theories, principles, and/or energy conversions underlying design
- ☑ **Design process and materials**, including portrayal of the evolution of final design
- ☑ **Design budget**, that details expenses of the design process and costs of the final apparatus
- ☑ **Discussion** of relationship between final design and practical applications
- ☑ **Lessons learned** section, reflecting on design process, team dynamics, future applications, etc.

## (3) Design Cost | 10%

Lastly, teams will be eligible for points based on the overall costs of their final design:

- **The team with the lowest cost will be awarded 10 points**, and all other teams will receive points proportionally to the amount spent on designing and building their apparatus.

These additional points will be weighted according to this category's weight (10%) and contribute to teams' overall scores in determining the competition's Grand Champions (*i.e., points in this category do not contribute to determining the bean bag competition winning team*).

## Competition Awards

This year's competition will include the following award categories. Details of prizes for each award will be detailed at the competition.

- |  |   |
|--|---|
| ➤ <b>Bean Bag Competition Winner</b>         | Total points awarded across competition rounds.   |
| ➤ <b>Best Presentation + Q&amp;A Session</b> | Ranked score determined by competition judges.    |
| ➤ <b>Crowd Favourite</b>                     | Decibel meter measurement of audience cheers.     |
| ➤ <b>Grand Champions</b>                     | Total points awarded across 3 scoring categories. |

## Budgets & Reimbursements

Once teams have confirmed participation via the competitor form, they will have a **maximum budget of \$500**. Faculty advisors may obtain a partial up-front allowance, and/or they can submit a reimbursement request for design-related expenses.

**Teams must keep an internal record of all expenses and retain all receipts to submit to [Engineering.Outreach@unbc.ca](mailto:Engineering.Outreach@unbc.ca).**

- **Allowance:** An up-front allowance of \$150 will be made available to each team's faculty advisor(s). *Receipts for each expense are required to document use of allowance funds; any unused funds must be returned to the School of Engineering.*
- **Reimbursements:** Faculty advisors can use [this requisition form](#) to request reimbursement for expenses exceeding the allowance amount, totalling a maximum of \$500 per team. Complete the Name, Address, Signature, Description and Totals sections in the form. *Receipts for each expense must be submitted with the requisition form to obtain reimbursement.*