

4th Annual Sustainable Dog House Challenge

Participant Information Packet

# Mission

The mission of the CAEE Sustainable Dog House Challenge is to challenge teams of civil, architectural, and environmental engineering students in the Cockrell School of Engineering to design and construct a usable doghouse built from recycled and locally sourced materials. Students gain awareness and valuable experience in engineering practice, helping complement their academic pursuits in topics such as structural and sustainable design, aesthetics, safety, teamwork, leadership, and project management.

# Problem Statement

Student teams participating in the 2019 CAEE Sustainable Dog House Challenge must work together to design and build a formidable shelter for dogs. Successful student designs will incorporate aspects from each of the following categories: sustainability, structure, health, comfort, and aesthetics. Student teams will also be required to document their design and building processes with a small poster and give a brief presentation on the day of the event describing these processes in addition to the materials used and the functionality of the dog house. Teams will be given extra marks for incorporating innovative and creative solutions above and beyond the base criteria.

# Eligibility

All students in the CAEE department are eligible to participate. Students are asked to form teams between two and five people and, based on the team members, will be placed into one of the following categories:

## Lower Division

This division includes teams made up of first- and second-year CAEE students. If a team consists of at least four members, one of these members can be an upper division (third-year to graduate) CAEE student. Teams eligible for lower division are able to participate in the upper division instead if they choose.

## Upper Division

This division includes teams made up of third-year to graduate level CAEE students. Teams with at least two upper level CAEE students will automatically be enrolled in this division.

If students from other departments are interested in participating, they may be allowed to join a team of primarily CAEE students subject to the discretion of the CAEE department.

# Safety

Safety is of the utmost importance and risk of personal injury will not be tolerated. CAEE department and event staff are empowered to stop and prohibit any activity which is deemed to be hazardous, which may result in the disqualification of the team.

Students should practice safe fabrication procedures and seek appropriate instruction and supervision. Teams that use the ECJ basement will be required to take and pass the UT online training module “OH500 – Machine Shop Safety” before being able to use the facility and its amenities. In addition, team members must schedule and attend site specific training with one of the ECJ technical staff. Students will be given further instructions on how to schedule these trainings via email from the event staff. Team members without either of these trainings will not be allowed to use the ECJ basement and are subject to disqualification if they use the facilities without the proper training. Students who wish to construct their dog house off campus do not need to complete the required trainings.

# Scoring

On the day of competition, judges assigned to specific categories will visit each dog house and score the dog house based on the criteria defined below. Scores from each category will be compiled to determine a student team’s overall grade. The following categories for competition are given below. A more detailed scoring breakdown can be found in Appendix A of this document.

## Sustainability

Student teams will be scored based on their use of sustainable/recycled materials, how much (if any) money was spent on gathering materials, and integration of “green” features such as a green roof, rain water collector, etc.

## Structure

Teams must produce sturdy structures capable of withstanding heavy winds and falling debris, in addition to exhibiting resistance to water intrusion. Dogs houses that are raised and incorporate some sort of insulation will receive higher scores. Dog houses will also be scored based on how easily the structure can be moved.

## Comfort

Internal and material temperatures will be measured using instrumentation on loan by the department and compared with the ambient conditions. Dog houses must also be safe for dogs of all sizes i.e. no sharp edges, exposed nails/screws, etc.

## Quality of Construction

Dog houses will be judged based on the craftsmanship and quality of the design.

## Information Card and Presentation

Teams will be asked to prepare a small information card summarizing their design and building processes and sustainability aspects of their finished dog house. At least one member must give a maximum, 5-minute informal presentation with the aid of their information card on the day of the competition to one of the judges.

## Innovation

Teams can accrue extra points based on aspects added to their dog house that the judges deem innovative.

In addition to these categories, points might also be deducted from your score if you build in the ECJ basement and leave behind trash, debris, materials, etc. Please be respectful of the space in the basement if you choose to use it. This category is included in Appendix B of this document.

# Information Card and Presentation

The information card should include, as a minimum:

* initial design drawing(s)
* section outlining the sustainable materials used
* fabrication methods/processes.

The information card needs to be at least the size of a typical 8.5” by 11” piece of paper, but can be larger. Please note that the information card is not meant to be a conference-grade poster nor is it meant to be a flier. Teams should take care to laminate the paper, use thicker cardstock material, or similar ideas to present a professional-looking information card. To achieve all points in this category, students can also incorporate photos taken during their planning, designing, and construction processes, an approximate project schedule, etc. The information card and accompanying presentation will be used to determine how effectively the team was able to address the mission of the CAEE Sustainable Dog House Challenge. The information card and presentation will be evaluated based on the following:

* Application of sustainable materials
* Design approach
* Project management
* Team inclusiveness
* Organization and neatness
* Alignment with the CAEE Sustainable Dog House Challenge Mission

# Testing

On the day of the event judges will test the structural rigidity of the dog house and the dog house’s resistance to water intrusion.

## Load Testing

This test will consist of 12.5-pound sandbags incrementally placed on the roof of each dog house (barring any obstruction) up to a maximum of 50 pounds (4 sandbags). The sandbags will be allowed to sit, unaided, for at least 10 seconds unless the weight causes the dog house’s structural integrity to be compromised.

Teams may opt out of the test at any point and will be awarded points based on the number of sandbags successfully loaded onto the dog house. Teams may opt out of this test completely by communicating with the judge conducting the test before the load is applied. Teams that opt out will receive zero points on this portion of the competition.

## Water Intrusion Test

This test encompasses a mock rainfall generated by one of the judges. The rainfall will last for 10 seconds and the interior of the doghouse will be monitored for the duration of the test. Afterwards, judges will examine the interior space of the dog house and award points based on the amount of moisture present.

Teams may opt out of this test by communicating with the judge before the test. Teams that opt out will receive zero points on this portion of the competition

# Judging

A judge will be appointed for each category listed above and will meet with every team on the day of competition. Judges will consist of industry professionals, UT CAEE professors, and graduate students. Judges have authority over conduct of the competition as well as interpretation of the rules. If any team thinks they were unfairly judged, they may take up their complaint with the CAEE staff on the day of the event or up to a week after the competition.

# Event Preparation

Teams will be required to bring their dog houses to the event location on the CAEE Outdoor Plaza by the start of the event on April 8th, 2020. Teams will lose points on their overall score if their dog house is not present or are not fully prepared by the start of the event. All team members are not required to be present at the beginning or during the entire event, but at least one member must remain with the dog house during the event. If conflicts of any nature prevent at least one team member from being present, please let the event staff know before the day of the event so arrangements can be made.

Each team will have an allotted space on the plaza to place their dog house. Signs will be posted to let teams know where these locations are, but event staff will be present if a team cannot find their spot. Volunteers will be present on the day of the event to help teams set up their dog houses, specifically those that constructed their dog houses in the ECJ basement. In order to use the elevator, dog houses must not exceed 46 inches in width or weigh more than 1200 lbs. Dog houses that cannot fit in the elevators or weigh too much can be wheeled around the building, but at a cost to the teams overall score. Please limit the size and weight of your dog houses.

# Code of Conduct

Dog house designs should be original and a product of the team’s creativity – designs, plans, drawings, etc. found elsewhere should not be used. If used, the team will be disqualified from the competition. Absolutely no copying of other teams designs is allowed. Use of ECJ facilities is a privilege that can be revoked if being misused. Any faculty or staff from the CAEE department or officer of the UT student branch of ASHRAE has the ability to disqualify a team if he or she believes the team is acting in a malicious manner.

# Appendix A: Point Allocation

Below is a breakdown of the points for each category and a qualitative look at how might be able to gain points within the categories.

**Sustainability (25 points)**: Use of sustainable materials and incorporation of “green” features

* **Materials:**
  + **Excellent:** All materials used were recycled and sourced from areas around Austin (not scavenged from ECJ basement)
  + **Good:** All materials used were recycled
  + **Fair:** Most materials used were recycled
  + **Poor:** Less than half of the materials used were recycled
  + **Bad:** Significant amount of materials were new and/or purchased
* **Green Features:** 
  + **Excellent:** At least two green features were incorporated (green roof, rainwater collection, solar-powered fan, buried structure, etc.)
  + **Fair:** One green feature is included
  + **Bad:** No green features were included

**Structure** **(25 points):**

* **Load Test:**
  + **Excellent:** No structural deformation
  + **Good:** Minor deformation, but structure retains overall integrity
  + **Fair:** Noticeable deformation that permanently alters the structure
  + **Poor:** Major, irreversible deformation
  + **Fail:** Structure is deformed and can no longer provide shelter or team opts out of test completely
* **Water Intrusion Test:**
  + **Excellent:** No water is in the interior of the doghouse
  + **Good:** Minor amounts of water are found inside the doghouse
  + **Fair:** Noticeable amount of water intrusion – dog would get wet
  + **Poor:** Majority of interior is wet
  + **Fail:** Almost entire interior is wet or team opts out of test completely
* **Weight and Size:** 
  + **Excellent:** Doghouse is easily transportable – can be lifted and moved by two people and one dimension is less than 46 inches
  + **Fair:** Doghouse can be transported by 3 to 4 people and one dimension is less than 46 inches
  + **Bad:** Doghouse requires more than four people to move, weighs more than 1200 lbs, and/or one dimension is less than 46 inches
* **Austin Animal Shelter Requirements**
  + **Excellent:** Doghouses are raised and are heavily insulated
  + **Fair:** Doghouses are raised or well-insulated
  + **Bad:** Doghouses are not raised and provide no insulation

**Comfort (15 points):**

* **Interior Temperature:**
  + **Excellent:** Interior temperature is comfortable and means to ventilate (even passively) are incorporated
  + **Good:** Interior temperature is adequate and minor ventilation is possible
  + **Fair:** Interior temperature is warm or ventilation is not provided
  + **Bad:** Interior temperature is too warm and ventilation is not provided
* **Surface Material Temperature:**
  + **Excellent:** Surface temperature is normal or does not have the ability to appreciably heat up
  + **Good:** Surface temperature is adequate – materials are subject to temperature swings
  + **Fair:** Surface temperature is warm – materials have a high conductivity
  + **Bad:** Surface temperature is too warm – materials respond to rapidly/easily to outdoor conditions
* **Safety:**
  + **Excellent:** No screws, nails, sharp corners, or other hazardous materials/designs that could harm a dog are apparent
  + **Fair:** Minor hazardous materials are present
  + **Bad:** Doghouse, as built, poses risk to the safety of a dog

**Healthy (10 points):**

* **Potential for Mold:**
  + **Excellent:** No potential for mold growth
  + **Fair:** Potential for mold growth
  + **Bad:** Mold already present
* **Material Off-Gassing**
  + **Excellent:** No potentially harmful finishes are applied to the materials and low levels of VOCs detected
  + **Fair:** Some finished might present harm and/or medium levels of VOCs detected
  + **Bad:** Harmful finishes applied to materials and/or high concentrations of VOCs are detected

**Quality of Construction (10 points):**

* **Excellent:** Doghouse is well-built and shows the team’s dedication to a pristine, final product.
* **Good:** Doghouse is generally well-constructed and the team demonstrated attention to detail and craftsmanship
* **Poor:** Doghouse has noticeable construction errors/imperfections or team is missing major component of their original design
* **Bad:** Dog house has major construction errors – team did not exhibit care in construction

**Information Card and Presentation (10 points):**

* **Information Card:** 
  + **Excellent:** Students include design drawings, photos of the team in the process of building and/or the stages of the doghouse, and list how their doghouse materials were found and used. Team also highlights green and innovative features of the doghouse.
  + **Good:** Students include low-tech or low-resolution design drawings, a few photos, and highlight the green and innovative features of the doghouse.
  + **Fair:** Students do not include photos or drawings or have very limited number. Materials, green, and innovative features are highlighted but in a limited manner.
  + **Bad:** Team does not have an information card or it appears to have been made haphazardly at the last moments of the competition.
* **Presentation:** 
  + **Excellent:** Presentation stays within five minutes and the student(s) are able to mention their initial design process, the building process, and how each team member contributed to the overall project.
  + **Fair:** Presentation goes a little long (one-point deduction for each minute over five minutes rounded) or the team does not mention two of the following: their initial design process, the building process, and how each team member contributed to the overall project.
  + **Bad:** Students go four minutes over the allotted five minutes or presentation is sloppy their initial design process, the building process, and how each team member contributed to the overall project are not addressed.

**Innovation (5 points):**

* **Highly Innovative:** Team goes above and beyond to add innovative features past the basic requirements
* **Innovative:** Team adds one innovative features beyond the basic requirements
* **Minorly Innovative:** Team demonstrates use of minor innovative features beyond the basic requirements
* **None:** Team does not incorporate any extra, innovative features

# Appendix B: Point Deduction

Below is a breakdown of the possible ways points can be deducted from your final score.

**Team Cleanliness (up to -10 points)**

* **Excellent:** Team regularly picks up after themselves and leaves little to no trash/debris on the day of the competition
* **Good:** Team doesn’t pick up after themselves consistently, but still cleans up almost entirely on the day of competition
* **Fair:** Team doesn’t pick up after themselves consistently and leaves a noticeable amount of trash/debris on the day of competition
* **Poor:** Team rarely picks up after themselves and leaves a large amount of debris on the day of the event