

3rd Annual Sustainable Dog House Challenge

Participant Information Packet

# Mission

The mission of the CAEE Sustainable Dog House Competition 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 primarily 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 Competition 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 CAEE student.

## 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. Teams eligible for lower division are also eligible to participate in this division instead if they choose.

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.

## Healthy

Formaldehyde, volatile organic compounds (VOCs), and the potential for mold/fungal growth will be measured in the interior of the dog house using instrumentation on loan by the department.

## Comfort

Internal and material temperature and relative humidity will be measured in the interior of the dog house 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.).

## Aesthetics

Dog houses will be judged based on the craftsmanship and originality 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.

# Information Card and Presentation

The information card should include, as a minimum: an initial design drawing(s), a section outlining the sustainable materials used, and 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 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

The load testing will consist of a 50-pound sandbag placed near the center of the roof (barring any obstruction). The sandbag 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 this test by communicating with the judge 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 be created for 10 seconds and the interior of the doghouse will be monitored for the duration of the test. Judges will examine the interior space of the doghouse and score the dog house depending 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 will 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.

# 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 3rd, 2018. 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 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 should 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.

# Appendix A: Scoring Rubric

Below is the scoring rubric and the suggested points allocation for each category.

**Sustainability (10 points)**: Use of sustainable materials and incorporation of “green” features

* **Materials (6 points):**
  + **Excellent (6):** All materials used were recycled
  + **Fair (4):** Most materials used were recycled
  + **Poor (2):** Less than half of the materials used were recycled
* **Green Features (4 points):** 
  + **Excellent (4):** At least two green features were incorporated
  + **Fair (2):** One green feature is included

**Structure** **(14 points):**

* **Load Test (4 points):**
  + **Excellent (4):** No structural deformation
  + **Good (3):** Minor deformation, but structure retains overall integrity
  + **Fair (2):** Noticeable deformation that permanently alters the structure
  + **Poor (1):** Major, irreversible deformation
  + **Fail (0):** Structure is deformed and can no longer provide shelter or team opts out of test
* **Water Intrusion Test (4 points):**
  + **Excellent (4):** No water is in the interior of the dog house
  + **Good (3):** Minor amounts of water are found inside the dog house
  + **Fair (2):** Noticeable amount of water intrusion – dog would get wet
  + **Poor (1):** Majority of interior is wet
  + **Fail (0):** Almost entire interior is wet or team opts out of test
* **Weight and Size (2 points):** 
  + **Excellent (2):** Dog house is easily transportable – can be lifted and moved by one to two people and one dimension is less than 46 inches
  + **Fair (1):** Dog house can be transported by 3 to 4 people and one dimension is less than 46 inches
  + **Fail (0):** Dog house 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 (4 points)**
  + **Excellent (4):** Dog houses are raised and are heavily insulated
  + **Fair (2):** Dog houses are raised or well-insulated
  + **Fail (0):** Dog houses are not raised and provide no insulation

**Healthy (10 points):**

* **Formaldehyde (4 points):** 
  + **Excellent (4):** Formaldehyde concentrations are undetected or at background concentrations
  + **Fair (2):** Formaldehyde concentrations are elevated, but relatively safe
  + **Fail (0):** Formaldehyde concentrations are unsafe
* **VOCs (4 points):**
  + **Excellent (4):** VOC concentrations are undetected or at background concentrations
  + **Fair (2):** VOC concentrations are elevated, but relatively safe
  + **Fail (0):** VOC concentrations are unsafe
* **Potential for Mold (2 points):**
  + **Excellent (2):** No potential for mold growth
  + **Fair (1):** Potential for mold growth
  + **Fail (0):** Mold already present

**Comfort (10 points):**

* **Interior Temperature (3 points):**
  + **Excellent (3):** Interior temperature is comfortable
  + **Good (2):** Interior temperature is adequate
  + **Fair (1):** Interior temperature is warm
  + **Fail (0):** Interior temperature is too warm
* **Surface Material Temperature (3 points):**
  + **Excellent (3):** Surface temperature is normal
  + **Good (2):** Surface temperature is adequate
  + **Fair (1):** Surface temperature is warm
  + **Fail (0):** Surface temperature is too warm
* **Relative Humidity (2 points)**
  + **Excellent (2):** The relative humidity in the space is well controlled
  + **Fair (1):** The relative humidity in the space is that of the outdoors
  + **Fail (0):** Relative humidity is higher in the interior than the outdoors
* **Safety (2 points):**
  + **Excellent (2):** No screw, nails, sharp corners, or other hazardous materials that could harm a dog are exposed
  + **Fair (1):** Minor hazardous materials are present
  + **Fail (0):** Doghouse, as built, poses risk to the safety of a dog

**Aesthetics (6 points):**

* **Excellent (6):** Dog house is well-built and shows the team’s dedication to a pristine, final product.
* **Good (4):** Dog house is generally well-constructed and the team demonstrated attention to detail and craftsmanship
* **Poor (2):** Dog house has noticeable construction errors/imperfections
* **Fail (0):** Dog house has major construction errors – team did not exhibit care in construction

**Information Card and Presentation (8 points):**

* **Information Card (4 points):** 
  + **Excellent (4):** 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 (2):** Students include low-tech or low-resolution design drawings, a few photos, and highlight the green and innovative features of the doghouse.
  + **Fair (1):** Students do not include photos or drawings or have very limited number. Materials, green, and innovative features are highlighted but in a limited manner.
  + **Fail (0):** Team does not have an information card or it appears to have been made haphazardly at the last moments of the competition.
* **Presentation (4 points):** 
  + **Excellent (4):** 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 (2):** 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.
  + **Fail (0):** 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 (6 points):**

* **Highly Innovative (6):** Team goes above and beyond to add innovative features past the basic requirements
* **Innovative (4):** Team adds one innovative features beyond the basic requirements
* **Minorly Innovative (2):** Team demonstrates use of minor innovative features beyond the basic requirements
* **None (0):** Team does not incorporate any extra, innovative features