# Submission Guidelines for Participants

The projects should demonstrate a concept in biology or tell a story of discovery in the history of biology. Teams of participants will work with their graduate student mentor to design their final project plan through a series of weekly meetings. The design document is due **by December 9th, 2022.**

**Design submission requirement:**

The design for a participant group should contain the following sections:

1. Title of the project.
2. The names of the participants, teachers, and graduate student mentors.
3. Description – This section should give an overview of the scientific concept that the group aims to demonstrate with their project.
    a. One paragraph should be dedicated to describing the significance of your project idea to a lay audience (those who have not had the chance to learn from your mentors). In other words, why do you think people should learn about this story or concept through your art?
    b. In 1-2 paragraphs, the participants should discuss what aspects of the topic they intend to incorporate into their project. These paragraphs should include all the relevant scientific details – cells, molecules, etc.
4. Project design – This section should be either a sketch, a diagram, or a text description of what the baking project looks like. This should include the form, cooking method, and ingredients for all the components of the project. Also included in this diagram should be a breakdown of each component of the design, and how they connect with the scientific concept or story that the project aims to portray.
5. Plan of Execution – This section should contain a timeline of how the participants intend to produce their baking project before the final event date.
6. Declarations for dietary restrictions – Will your final product contain common allergens? Dairy products, eggs, or meat? Please provide a list of all potential allergens and animal products to help our audiences know whether or not they can enjoy your hard work!
7. Budget - Provide an itemized list of ingredients (in market price) your team needs to bake the project.

**Rubric for judging the final project:**

- Science – 40%
    - Accuracy – an excellent (4) project should paint an accurate picture of the biological concept or story. A good (3) project would be largely accurate, except for some missing details or inaccuracies. A fair (1-2) project can have significant inaccuracies that make the picture confusing or inconsistent but are not factually wrong or misleading. An insufficient (0) project would contain major factual errors that are easily verifiable.
    - Complexity – an excellent (4) project would demonstrate a concept with molecular and cellular details accurately or tell a story that highlights the rationale of an experiment or discovery. A good (3) project demonstrates an interesting and relevant concept but misses some details. A fair (1-2) project deals only with simple concepts or oversimplifies a topic.

    - Knowledge – An excellent (4) team can provide a detailed and accurate description of their project and can answer questions regarding their project intelligently. A good team (3) can describe their topic accurately for the most part. A fair (1-2) team understands the basic concepts that underlie their project but may not be able to discuss details. A team that is unable to describe their project to the audience is insufficient (4).
- Design – 30%
    - Aesthetics: rating by our judges from 1-4, based on how the final product looks overall.
    - Creativity: How creative is the form of this project? Is this product a good representation of the story or concept the group intends to tell?
    - Presentation. Is the style of presentation concise and logical?
- Taste – 30%  Decided by our guest judges from local bakeries.

**Other requirements for participants:**

1. Participants must submit a short description (1 paragraph) of their project, as well as a list of potential allergens and/or animal products. This will be printed on a title card to be featured with the final product.
2. All final baking products must be protected from unnecessary handling in a covered container when transported on the final day of the presentation.

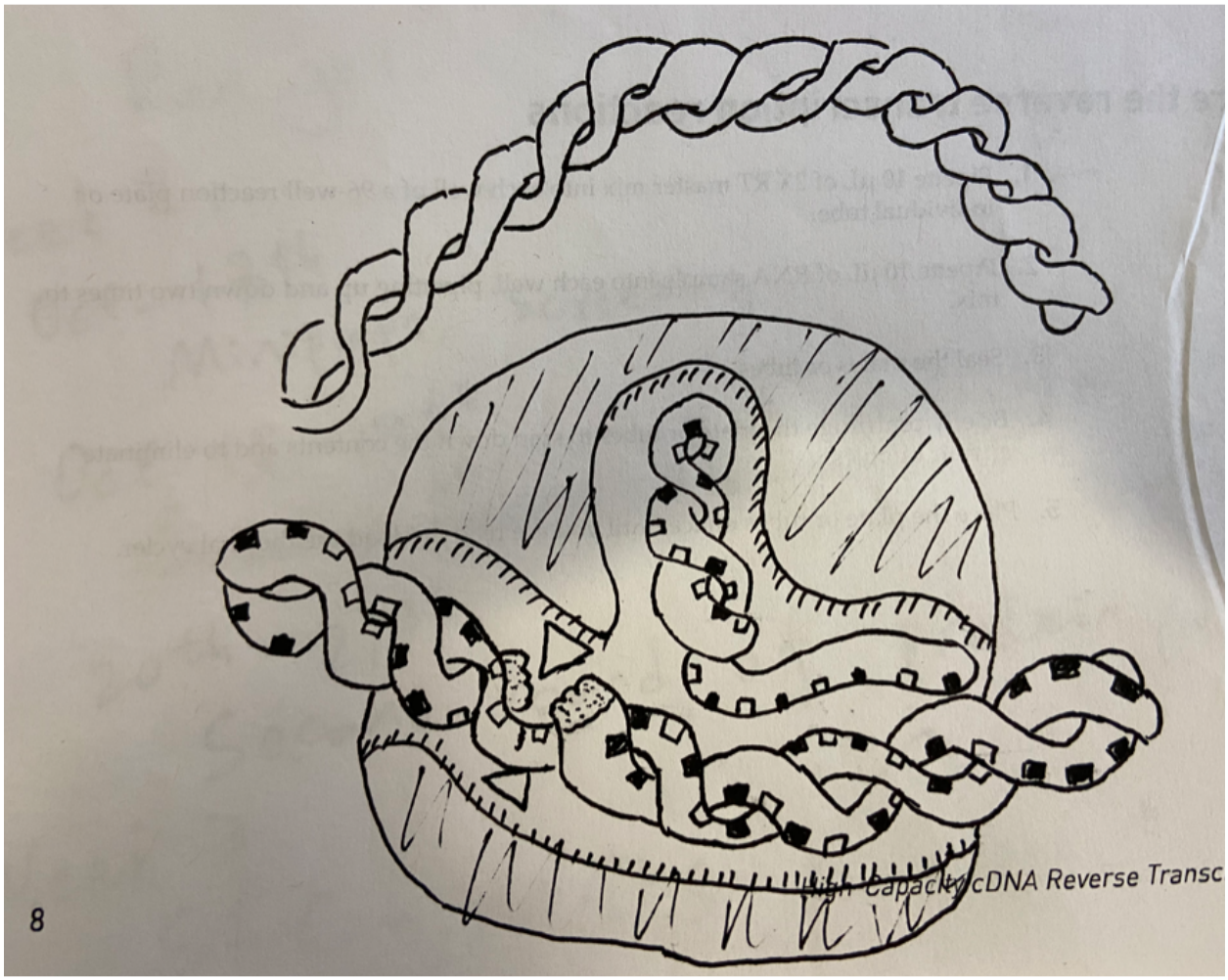
**Sample baking project:**

1. Title – CRISPR/Cas9-mediated gene editing Bread
2. Team members: Bucky Badger et al.
3. Description – Clustered Regularly Interspaced Short Palindromic Repeats, or CRISPR-mediated gene editing, is a technique biologists use to modify the genetic sequence. Scientists can use CRISPR/Cas9-mediated gene editing technology to create therapies to treat genetic disorders, or to create genetically edited crops that are disease-resistant or drought-resistant.

   In order to modify the genes within a cell, an enzyme called Cas9, which can cut the DNA in a cell at a precise location, determined by a molecule called the guide RNA, is introduced to the cell. The guide RNA is designed by scientists to recognize a particular area in the DNA molecule, based on the specific sequence of nucleotides – the letters that make up genetic code.

   After the cut is made by the Cas9 enzyme, the cell will attempt to fix this cut by using DNA that has a similar sequence to the one that is cut. Along with the Cas9 enzyme and guide RNA, a lot of extra DNA molecules, called “repair templates”, are also added to the cell, so that the repair process will be based on these repair templates. The repair templates contain the sequences we want the gene to change to.

4. Project design –




In this design, the DNA molecules are represented by braided bread with chocolate chips inserted at regular distances. The black chocolate and white chocolate chips represent the adenine-thymine nucleotide pairs and the cytosine-guanine nucleotide pairs, respectively. Above the DNA bread, a single stranded - partially braided bread that represents the guide RNA sticks closely to the DNA molecule, with identical sequences of chocolate chip pattern, representing complementary sequences. Underneath the main DNA molecule lies a large chocolate cookie with troughs fitting the DNA and RNA bread, representing the Cas9 enzyme. Within the trough where the DNA sits, two large triangular pieces of white chocolate denoting the active site of the Cas9 enzyme that cuts the DNA. One strand of the DNA bread is cut open at the active site, whereas the other strand is partially cut, showing the reaction in motion. Not far away, another piece

of DNA bread sits, with chocolate chip sequence matching the areas around where the genomic DNA was cut (not shown in diagram), representing the repair template donor. We will color the RNA differently from the DNA by using beet juice in the dough.

5. Plan of execution

   We plan to prepare the dough for the DNA and RNA bread the day before the event. On the day before, we will knead and braid the dough to form the shape, as well as add in the chocolate chip sequences, cover, and refrigerate until the next day. On the day of the event, we will bake both the Cas9 chocolate cookie and the bread pieces, assemble the project, and come to the event to present our work.

6. Declaration for dietary restrictions: The final product will contain eggs, wheat, chocolate, and milk.