Challenge Rubric v4.0, Fall 2020

This rubric articulates the criteria that judges will be using to evaluate entries and select award winners. Award-worthy work will generally fall into the "Exceeds Expectations" column. Work that "Meets Expectations" satisfies the learning goals of the program.

Reminder: References to supporting research should be included wherever appropriate. Suggested citation formatting: MLA style, https://www.bibme.org/mla

Exceeds Expectations	Meets Expectations	Below Expectations
Problem Definition (20%)		
Team: • <u>Identified and described a specific real-world problem</u> that is <u>relevant</u> to the larger challenge described in the YDC design brief, and that <u>could be solved</u> through the development of a bio-inspired object, tool, process, or system.	Team: • <u>Identified a specific real-world problem</u> that is <u>relevant</u> to the larger challenge described in the YDC design brief, and that <u>could be solved</u> through the development of a bio-inspired object, tool, process, or system.	Team: • <u>Insufficiently identified a specific real-world problem,</u> the selected problem <u>is not relevant</u> to the larger challenge described in the YDC design brief, and/or it <u>cannot be solved</u> through the development of a bio-inspired object, tool, process, or system.
• <u>Compared multiple causes</u> that contribute to the chosen problem, <u>described</u> how the causes are connected and <u>identified</u> which cause can be most effectively addressed.	• <u>Described the cause(s)</u> that contribute(s) to the chosen problem.	• <u>Did not clearly describe the cause(s)</u> that contribute(s) to the chosen problem.
• <u>Clearly identified and described multiple</u> relevant criteria (requirements) and constraints (limitations) for potential design solutions, <u>including impacts</u> on the environment, people, and/or communities.	• <u>Identified relevant</u> criteria (requirements) and/or constraints (limitations) for potential design solutions. These may include impacts on the environment, people, and/or communities.	• <u>Did not adequately identify relevant</u> criteria (requirements) or constraints (limitations) for potential design solutions. <u>Missing</u> possible impacts on the environment, people, and/or communities

Exceeds Expectations	Meets Expectations	Below Expectations
Biological Models 20%		
Team: • <u>Identified and compared two or more</u> organisms (or biological phenomena) as potential models for design solutions to the problem.	Team: • <u>Identified two or more organisms</u> (or biological phenomena) as potential models for design solutions to the problem.	Team: • <u>Identified one or zero organism(s)</u> (or biological phenomena) as a potential model for design solutions to the problem.
• <u>Thoroughly and accurately described</u> the relevant natural history of the biological models, including a <u>clear explanation</u>, <u>with images</u>, of how their particular physical structures, behaviors, and/or processes work and a <u>description of information found from research</u>.	• <u>Accurately described</u> the relevant natural history of the biological models including an <u>explanation</u> of how their relevant physical structures, behaviors, and processes work.	• <u>Incompletely or inaccurately described</u> the relevant natural history of the biological model(s).
• <u>Selected the most suitable</u> biological model(s) for a design idea, and <u>argued from evidence</u> for this choice.	• <u>Selected the most suitable</u> biological model(s) for a design idea, and <u>explained the reason</u> for this choice.	• <u>Selected poorly suited</u> biological model(s) for a design idea and/or <u>provided incomplete or inaccurate explanations</u> for the suitability of chosen biological model(s).

Exceeds Expectations	Meets Expectations	Below Expectations
Iterative Design Cycle (20%)		
Team: • Identified, thoroughly described, and compared two or more design ideas that apply strategies from biological models.	Team: • Identified and described two or more design ideas that apply strategies from biological models.	Team: • Identified and described one design idea that applies strategies from biological models **OR** Identified and described one or more design ideas that do NOT clearly apply strategies from biological models.
• Created and described multiple models (drawings, diagrams, or other visual representations) of two or more design ideas that could be tested and/or shared with others.	• Created and described one or more models (drawings, diagrams, or other visual representations) of one or more design ideas that could be tested and/or shared with others.	• Did not create model(s) (drawings, diagrams, or other visual representations) of the design idea that could be tested and/or shared with others.

• Gathered data about the potential effectiveness of the idea(s) by:
    * Thoroughly testing models and/or
    * Getting feedback from two or more experts or community members impacted by the problem or solution.
	• Gathered data about the potential effectiveness of the idea(s) by:
	    * Testing models and/or
	    * Getting feedback from an expert or community member impacted by the problem or solution.
		• Gathered incomplete or inaccurate data about the potential effectiveness of the idea(s) due to:
		    * Poorly designed tests or models and/or
		    * Not seeking feedback, or only speaking with people who are not experts or community members impacted by the problem or solution.

• Analyzed data (tests or feedback) to determine how well the design idea meets several of the design's criteria and constraints and where improvements could be made. Additional improvements to the design were made.	• Analyzed data (tests or feedback) to determine whether the design idea meets at least one of the design's criteria and constraints, and described where improvements could be made.	• Did not clearly explain or analyze data (tests or feedback) and/or did not use data to decide how to make design improvements.

Exceeds Expectations	Meets Expectations	Below Expectations
Proposed Design Solution (20%)		
Team: • <u>Created multiple</u> models (drawings, diagrams, or other visual representations) that <u>clearly represented</u> the proposed design solution.	Team: • <u>Created one</u> model (drawings, diagrams, or other visual representations) that <u>clearly represents</u> the proposed design solution.	Team: • <u>Did not create a model</u> (drawing, diagram, or other visual representation) of the proposed design solution **OR** provided model <u>does not clearly represent</u> the proposed design solution.
• <u>Thoroughly described</u> the proposed design solution: What it does, how it works, and how it is informed by the biological model(s).	• <u>Described</u> the proposed design: What it does, how it works, and how it is informed by the biological model(s).	• <u>Incompletely described</u> the proposed design: what it does, how it works, and how it is informed by biological model(s).
• <u>Argued from collected evidence</u> why the proposed design is more effective at solving the problem than previous or existing designs.	• <u>Explained why</u> the proposed design is more effective than previous or existing designs.	• <u>Incompletely explained</u> how the proposed design solution is more effective than previous or existing designs.
• <u>Described in detail</u> how the proposed design would have beneficial impacts on the environment, people, and/or communities.	• <u>Identified</u> beneficial impacts of the design on the environment, people, and/or communities.	• <u>Incompletely or inaccurately</u> described how the proposed design solution could have a beneficial impact on the environment, people, or communities.
• <u>Identified and described several next steps</u> for developing the proposed design. These could include limitations (constraints) of the model that need to be overcome, questions that need to be answered, or other ideas for refining the proposed design or creating a new one.	• <u>Identified at least one</u> next step for developing the proposed design. This could include limitations (constraints) of the model that need to be overcome, questions that need to be answered, or other ideas for refining the proposed design or creating a new one.	• <u>Did not include</u> reflections on next steps for developing the proposed design.

Exceeds Expectations	Meets Expectations	Below Expectations
Communication and Presentation (20%)		
• Prepared submission materials that are <u>complete</u>, <u>meet</u> the stated requirements, and <u>creatively take advantage of the format and purpose of each required part of the submission.</u>	• Prepared submission materials that are <u>complete and meet</u> the stated requirements.	• Prepared submission materials that are <u>incomplete</u> and/or <u>do not meet the stated requirements.</u>
• <u>Thoroughly and creatively described and presented</u> the team's journey through the design cycle and clearly <u>explained how</u> they arrived at the proposed design solution, reasons for the decisions made, and key insights from studying biological models.	• <u>Clearly described</u> the team's journey through the design cycle and <u>explained</u> how they arrived at the proposed design solution, reasons for the decisions made, and key insights from studying biological models.	• <u>Did not clearly describe</u> the team's journey through the design cycle <u>leaving questions</u> about how they arrived at the proposed design solution, reasons for the decisions made, and/or key insights from studying biological models.
• <u>Used ample, high quality visuals</u> (photos, illustrations, charts/diagrams, etc.) to support explanations.	• <u>Used relevant visuals</u> (photos, illustrations, charts/diagrams, etc.) to support explanations.	• <u>Used inadequate or irrelevant visuals</u> (photos, illustrations, charts/diagrams, etc.) to support explanations.
• Produced presentation materials that are <u>very well-organized</u>, with <u>clear meaning</u> and <u>accurate</u> grammar and spelling.	• Produced presentation materials that are <u>organized with mostly accurate</u> grammar and spelling.	• Produced presentation materials that are <u>poorly organized</u>, **and/or** have <u>abundant grammar and spelling errors</u>.
• Provided <u>complete and well-organized</u> (e.g., alphabetized, categorized, annotated) citations for all references to research, claims, and images.	• Provided <u>complete and organized</u> citations for all references to research, claims, and images.	• Provided <u>incomplete and/or poorly organized</u> citations for research, claims, and images.