Molecular Modeling MO

Category Requirements – 30%	
30 pts.	**Model –** Further broken down into: **Creativity of design/materials – 10 pts.** **Degree of interactivity -- 10 pts.** **Durability – 5 pts.** **Overall presentation – 5 pts.** Create a model that demonstrates the interaction of two or more molecules of relevance to biotechnology or biomedicine (enzyme/substrate, DNA and binding protein, etc.). The molecules may either represent a widely accepted model of interaction or may model a hypothetical relationship. For example, you may design a hypothetical molecule ('drug') to interact with a drug target. In that case, the target needs to be clearly indicated and described. ▪ Must be a 3-D physical model. Refer to the *Molecular Modeling Tips* sheet for information on programs for 3-D visualization. ▪ Must be durable and freestanding. ▪ Maximum size consistent with Expo Guidelines for displayed work. ▪ Store-bought molecule kits cannot be the sole basis for the model, unless used in a novel way.

Science Content– 30%	
30 pts.	**Science Background Paper (5-8 pages)** ▪ Overview of the importance of models in research ▪ Brief summary of technology behind determining structures and models ▪ The relation of your model's structure to its function ▪ The overall biological system that your model is part of (the big picture) ▪ Any other relevant background on the molecules. Your paper should demonstrate a mastery of relevant scientific ideas by accurately explaining difficult concepts in terms a layperson could understand. The work should provide an appropriate combination of explanations, examples, and details that are specific, clear, and relevant to the topic. The content of your work should reflect critical thinking about the topic.

Connections and Collaborations; General Writing Requirements– 10%	
5 pts.	**Connections and Collaborations** Include 1-2 typed pages describing the connections you have made with other people as well as the resources you have used the most. More weight is given in judging to those students who put more effort into locating and using available resources. A good use of resources may include working with an advisor or mentor, making arrangements to tour a company, interviewing an adult in your field, in addition to reading an important paper or uncovering an invaluable website. What did you learn? How did this resource help you? An interview with an adult in the field carries far more weight than a Google search. You do *not* have to request a mentor through NWABR to excel in this area. If a qualified adult (i.e. your Expo Mentor, someone you interviewed or a tour guide at site visit) significantly helped you with your project, please include: a) The person's name, title and contact information. b) Dates you emailed, talked on the phone or met. c) Your thoughtful reflections on the experience of working with that person

5 pts.	**Paper Format and Annotated Bibliography** Papers should be typed/word processed with one-inch margins. Use an easily readable font such as Times Roman or Arial, 10-12 point, double-spaced. If included, illustrations must be neat and applicable, with a title and a source. Number your pages and label section headings. Consistently follow the rules of Standard English for usage, spelling, capitalization, and punctuation. If you are using Windows *Vista* or *7*, please use the 'save as' function to save your paper as a "Word 97-2003 Document." Annotated bibliography should be in standard MLA or APA format. Use a minimum of 5 sources. The bibliography should include all books, papers, journal articles, and communications used in your research. For at least 5 sources, provide one reason why you believe the source is credible and describe how it was used in your project.

Creativity -- 10%	
10 pts.	**Creativity** The most successful projects have been ones that have invited audience interaction or have presented a challenging concept in a new and engaging way. Show your ability to creatively approach or solve a problem, or present evidence of your understanding in ways that are novel or unique. Your project should reflect your special insights and abilities.

Poster/Interview at Expo Event – 20%	
10 pts.	**Poster** ▪ Provide a key that allows viewer to understand important features of the model. ▪ Describe how to interact with your model (if applicable) ▪ Highlight important information from your science background paper. Focus on the relation of your model's structure to its function as well as the overall biological system that your model is part of. ▪ Put your project title at the center of the display ▪ Include the same information that is on your cover sheet (Name, etc.) ▪ Make sure your writing is large enough to be read from 3 feet away. ▪ Use visual aids that relate to the topic and make the viewer want to learn more about it. Posters should convey important information about your project in a visually appealing manner. Displays and models must be freestanding and have the following maximum dimensions: 4 feet width, 2.5 feet depth, and 3 feet height (from table).
10 pts.	**Interview** ***Judges will be looking at your effectiveness in communicating your project to them, and your understanding of your topic.*** Your judge will want an overview of your project - practice giving a short (2-3-minute) 'walk-through' of your project that explains it in straightforward terms. You will receive written feedback from your judge regarding the strengths of your project, and how you could make it even better in the future. *The following are samples of the types of additional questions a judge might ask you:* Why were you interested in this topic? What did you learn from doing your project? What was the most enjoyable/difficult aspect of doing this project? What else would you like to find out about this topic?
100 points total	

What you need to do on or before April 22nd, 2018

❑**Register** for the Student Bio Expo. Student registration will be open between April 2nd with a deadline of Sunday midnight April 22nd, 2018.

❑**Submit** an electronic copy of your project to NWABR (and your teacher) using the **BOX cloud storage**. Further registration and submission information will be posted at: https://www.nwabr.org/events-programs/student-events/student-bio-expo

What you need to bring to the Expo

Bring a hard copy of your written work. Include the following:

- ❑ **Cover Sheet**
- ❑ **Science Background Paper**
- ❑ **Bibliography + Connections and Collaborations**
- ❑ **Poster**
- ❑ **Model**
- ❑ **Any electrical or AV equipment you may need**

Molecular Modeling Tips

One of the most exciting frontiers of biological investigation concerns the understanding of the three-dimensional structure of molecules and the relationship of their structure to function.

Scientists in many fields are working to try to make models that will predict not only the shapes of individual molecules, but also the interactions between them.

This is a challenging category, yet one that represents a truly important aspect of current research.

The model is not expected to consist of a laboratory grade ball-and-stick model. Models created of common materials can often provide a strong and creative analogy for the interactions between target molecules.

Resources

Cn3D (see in 3-D!) and the associated MMDB database
http://www.ncbi.nlm.nih.gov/Structure/CN3D/cn3d.shtml

Swiss PDB viewer
http://www.expasy.ch/spdbv/

Digital World Biology Tutorials
http://www.digitalworldbiology.com/dwb/Tutorials/Tutorials.html

Student Bio Expo

Student Name:

Student School:

Project Title:

Molecular Modeling MO

Judging Criteria (Judging criteria are explained in the *Student Requirements*)	Superior	Excellent	Good	Developing	Limited
Molecular Model Category Req. (30%)					
Creativity of design/materials (10 pts)					
Degree of interactivity (10 pts)					
Durabilit					
Overall presentation (5 pts)					
Science Content (30%)					
Science Background Paper (30 pts)					
Connections/Written Req. (10%)					
Connections and Collaborations (5 pts)					
Paper Format; Annotated Bibliography (5 pts)					
Creativity (10%)					
Creativity (10 pts)					
Poster/Interview at Expo Event (20%)					
Poster (10 pts)					
Interview (10 pts)					

Comments

(Please continue on back, if needed)

What I found particularly impressive about your project:

Pre- Judging:

Final Judging:

What you could do in the future to make it better:

Overall Rating (circle one)

Superior **Excellent** **Good** **Developing** **Limited**