



Protein Modeling Challenge

Hosted by Stony Brook University
Center for Science and Mathematics Education

Date of Competition: December 9, 2009, 8:30 AM to 1:00 PM
Deadline Date: September 30, 2009

Snow Date for Competition: December 11, 2009
Cost: \$35/team

- Description:** The structure and function of Insulin are the topics for this competition. The students will build a model of Insulin at their schools, and December 9 at Stony Brook University, the students will build another model of a portion of insulin or a related protein and answer questions about protein chemistry, biology and insulin. You can read more about these enzymes in the February 2001 RCSB Molecule of the Month written by David S. Goodsell (www.pdb.org). This competition is designed for students who have completed or are taking regents level chemistry and biology. All teams must be accompanied by a teacher who has taken one of the training sessions. There will be a limit of 36 teams in the competition. Your school can register one team on a first-come first-served basis; if space permits we will accept multiple teams from a school.
- Competition:** This event has three parts: a pre-built model (Part I), an on-site build model (Part II) and an on-site exam (Part III). Students may not bring any materials or computers of any kind into the on-site competition on December 9.
 - Part I: The Pre-Build Model.** Registered teams will receive a kit containing a Mini-Toober for building a model at a scale of 2cm/amino acid. Students will represent other important parts of the protein, such as amino acid side chains, DNA or associated molecules, where applicable, with materials of their choosing. The additions to the Mini-Toober® model should focus on illustrating the significance of the structure to the function of the protein. The models will be evaluated for accuracy. Students must provide a 3x5 note card explaining the creative additions to their model and what they represent. Models must arrive at Stony Brook University by December 2 for judging. The models will be returned.
 - Part II: The On-Site Model.** During the on-site competition, students will build a model of a selected region insulin or a related protein. Students will use a computer provided at the competition with the Jmol application, a text editor, PDB file, structure summary page and Molecule of the Month files on it to guide their model construction. Students may only use one of the computers provided at the competition with the above-mentioned files on it to guide their model construction. Any model handed to the judges after the end of the competition time (50 minutes) will not be accepted for scoring.
 - Part III: The On-Site Written Exam.** During this section of the competition, students will complete a multiple choice/short answer written exam with questions about the relationship between protein structure and function, with an emphasis on insulin. During the on-site competition, students

may use only the materials provided to answer the questions. Question content may not be limited to these materials. Any test papers handed to the judges after the end of the competition time (50 minutes) will not be accepted for scoring.

3. **Scoring:** 40% of the event score will be based on the pre-build protein model (Part I), 30% on the on-site build (Part II) and 30% on the written exam (Part III). The pre-build protein model (Part I) will be scored based on the accuracy and scale of the alpha-helix and beta-sheet secondary structures, other elaborations and enhancements on the protein backbone such as side chains, DNA or associated molecules. The focus of the model should be on creatively telling the story of the molecule's significance, structure and function. The on-site build protein model (Part II) will be scored based on accuracy of folding the Mini-Toober model and positioning specific amino acid side chains and/or accessory molecules. The exam (Part III) will be scored for accuracy. Ties will be broken using questions on the written exam selected by the event supervisor before the start of the competition.

There are several resources available to help you to prepare for this event and we encourage you to explore these resources.

- MSOE Center for BioMolecular Modeling Science Olympiad website. You can download a powerpoint that goes through the parameters of the event, the RasMol program and written workshop materials to help you prepare for this event: <http://www.rpc.msoe.edu/cbm/scienceolympiad/>

- MSOE Model Lending Library www.rpc.msoe.edu/lib. You may borrow molecular models that allow you to explore the basics of protein structure. We recommend the IP collection: Introduction to Protein Structure.

¹ Mini-Toobers[®] are products of 3D Molecular Designs, Wauwatosa, WI, www.3dmoleculardesigns.com

For questions, please contact:

Joan Kiely at joan.kiely@stonybrook.edu

For a registration form, please see our website:

<http://www.stonybrook.edu/cesame/teachers/Competitions/>

Sponsored by

(osi)[™] pharmaceuticals
foundation

Changing lives in our communities.™

Protein Modeling Challenge

at Stony Brook University

December 9, 2009

8:30 a.m. – 1:00 p.m.

Fee: \$35 per team

This program is designed for students who are enrolled in or have completed regents level chemistry and biology.

Teacher's Name _____
last first middle

School _____

Address _____
street

city state zip

E-mail address _____

Telephone number _____

Teachers must attend **one** of the training sessions – please check preferred section:

Training location to be announced.

- Wednesday, September 30, 4:00 – 6:30
- Saturday, October 3, 9:30 - noon
- If space permits, our school would like to bring a second team to the competition (for an additional \$35 fee)

Mail check for \$35 made payable to the Research Foundation of SUNY, fax or e-mail registration form **by September 30** to:

Center for Science and Mathematics Education

Stony Brook University

Stony Brook, NY 11794-5233

Telephone: 631-632-9750; Fax: 631-632-9791

Website: <http://www.stonybrook.edu/cesame/teachers/Competitions/>

e-mail: cesame@stonybrook.edu

(osi) pharmaceuticals
foundation

Changing lives in our communities™