

Task #1

Introduction to SMART Teams and Protein Structure-Function

Due: Friday, September 15th

Introduction to SMART Teams

Students, welcome to SMART Teams! Some of you may be veteran members, while some of you may be brand new. Either way, we are so glad to have you on board! Please take some time to familiarize yourself with the following:

- SMART Team Program Goals and The SMART Team Partnership, including the roles and responsibilities. Your teacher has copies of these. If you have questions, please discuss with each other and your teacher.
- Center for BioMolecular Modeling website (<http://cbm.msoe.edu/>). Specifically, take a look at the Milwaukee Area SMART Teams page under the “Student Programs” tab. Here you will find mentor information, task info, dates of events, and your progress bar to track the completion of your tasks. Periodically, we will post photographs of teams in action here as well!
- Under General Information (on the left), take a look at some past SMART Team projects to get an idea of what your project will be like. Also, check out the MSOE Scholarship Opportunities for SMART Team students who are admitted to the University!
- Take some time with your teacher to review the basic properties of Water and Amino Acid structure. These fundamentals are important for you to fully understand protein structure and function. You may use the Water Kit and the Amino Acid Molymods to explore these concepts. Your teacher may have these kits, or they can borrow them from our lending library at:
<http://cbm.msoe.edu/lendingLibrary/index.php>

Introduction to Protein Structure-Function

Once you’ve reviewed properties of water and amino acid structure, check out the “*What is a Protein*” video link on the Protein Data Bank website, and answer a few questions:

<http://pdb101.rcsb.org/teach/biomolecular-structures-and-models/learning-materials>

- 1) Which subunit of an amino acid is the one that varies and determines the properties of that amino acid?
- 2) Identify and describe the 3 major chemical properties that amino acids take on.
- 3) What gives proteins their distinct shape and chemical characteristics?
- 4) How many levels of protein structure are there?
- 5) Describe the two major types of secondary structures.
- 6) Give an example of how shape recognition in proteins is so important.

Next, you will explore the basic principles of protein folding by modeling with the Amino Acid Starter Kit.

Amino Acid Starter Kit Questions:

- 7) Take a photo of the amino acid models from the Amino Acid Starter Kit (OR draw the structures of) the following 4 R-groups:

Arginine, Cysteine, Tyrosine, and Phenylalanine

- 8) Describe the **chemical properties** of each of the amino acids listed above, including how they would contribute to protein folding.
- 9) Construct a protein following the instructions from the “Amino Acid Starter Kit in Brief” found on the CBM Website: http://cbm.msos.edu/images/contentImages/smartTeams/aaskBrief_noAnswers.pdf
- 10) Fold your protein **incorporating secondary structure** and demonstrating compliance of **all 4 basic “rules of chemistry”**.
- 11) Insert a **Photograph** of your folded protein model. **Label** your photograph with each of the following:
- The N-terminus and C-terminus ends of your protein
 - Locating where each of the four rules of protein folding have been implemented
 - Two secondary structures (alpha helices and beta sheets)

This task will be marked as complete on the progress bar when your team emails the correct answers (#1-11) to Judy (birschbach@msos.edu) no later than

Friday, September 15th

First, second and third place WILL be awarded for Task #1!