

## Study Guide – Exam 2

The material for section two has been quite conceptual and the exam will be as well. Questions will consist of the short answer variety. In studying, you should emphasize understanding the principles behind each topic. For techniques, know the strengths and weaknesses of the approach, and what one can learn on analytical and bulk scales. Know when one technique is superior to another. The material you are responsible for is the assigned reading with an emphasis consistent with the lectures. Topics that were briefly mentioned in lecture without assigned reading are provided for your edification – and will hopefully help you in future reading and experimental design – but will not be on the exam. You do not need to memorize equations – any needed equations will be provided.

### *Assigned papers:*

1. Egea et al. Targeting proteins to membranes: structure of the signal recognition particle. *Curr Opin Struct Biol.* 2005 Apr;15(2):213-20. Review. PMID: 15837181
2. Baram et al. Structure of trigger factor binding domain in biologically homologous complex with eubacterial ribosome reveals its chaperone action. *Proc Natl Acad Sci U S A.* 2005 102(34):12017-22. PMID: 16091460
3. McDonough et al. (2006) *PNAS* 103:9814. PMID: 16782814

### *Sample questions:*

- 1) What is GroEL/ GroES and what role does it play *in vivo*? *GroEL / GroES is a large protein complex required for protein folding in prokaryotes (similar proteins are found in eukaryotes). It has a large chamber that can recognize and actively unfold misfolded proteins using ATP as an energy source. Folding is then allowed to proceed in isolation in the chamber, so that aggregation with other proteins is prevented.*
- 2) How can ammonium sulfate precipitation be used in protein purification? *Proteins have widely varying solubility at different ionic strengths. Increasing the ionic strength of a crude protein solution, for example to 50% saturation with ammonium sulfate, will induce some proteins to precipitate, while others remain soluble. This provides an easy means for protein fractionation and is often used early in a protein purification protocol.*
- 3) Define “modular protein” and give an example of a modular protein from the course material. *A modular protein is one that contains functional domains with separate, defined activities. Often such domains appear in many different proteins. Prolyl hydroxylase two (PHD2) is a modular protein with functional domains for DNA binding (zinc finger) and hydroxylase activity.*