Cleveland State University
Department of Chemical & Biomedical Engineering

BME 640 Protein Design (3-0-3)

Catalog Description: Protein Design (3-0-3) *Prerequisites: Graduate standing in Biomedical Engineering or consent of instructor.* The process and principles of protein design and synthesis, including concepts such as fundamentals of protein structure and function, gene design, gene editing, and protein expression and purification. Modern tools of molecular biology used for protein design will be introduced.

Coordinator: Nolan B. Holland, Professor

Course Objectives:
- Understand fundamental principles of protein design
- Learn how to use the tools used for protein design
- Develop skills for critically evaluating protein engineering literature
- Practice written and oral communication skills

Course Reading Materials

Required readings from current relevant literature will be posted weekly on Blackboard.
Reference: Bolsover et al. *Cell Biology: A Short Course, 3rd Edition*. Wiley and Sons, 2011.

Outline of Topics Covered

1. Introduction to proteins and protein design (1-2 hr)
2. Protein structure (2-3)
3. Protein folding thermodynamics and kinetics (3)
4. Transcription, translation, and post-translational modifications of proteins (3)
5. Protein expression and purification (3)
6. Protein design principles (3-4)
7. Student design proposal presentations (2-3)
8. Directed evolution (1-2)
9. Display methods (1-2)
10. Gene design principles (3-4)
11. Methods of gene assembly (3-4)
12. Genome editing (3)
13. Ethical issues (1-2)
14. Lab experiences (5-6)
15. Student final presentations (4-5)

Evaluation

Class Participation/presentations	20%
Homework	30%
Protein Design Project	50%

Grading Scale
90% A
87% A-
84% B+
80% B
75% B-
65% C

Prepared by: Prof. Nolan B. Holland Date: 10/24/2017