BMEN 4326 Principles of Biomolecular Engineering
BMEN 5326 Biomolecular Engineering
Spring 2022

Instructor: Dr. Clement Chan
Office: Discovery Park K240H
Class: NTDP B192; Monday and Wednesday; 12:30 – 1:50 pm
Office Hours: Monday and Wednesday, 4:00 am to 5:30 pm
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Prerequisite: BMEN 3310

Description: To engineer biological systems, it is essential to develop biomolecular components with novel, desirable functions. These components include enzymes, structural proteins, receptors, and other macromolecules. Recent advances in biomolecular engineering open many new possibilities in protein design and protein construction. In this course, we will discuss protein structure and biochemistry, a wide range of strategies in designing macromolecules, generating libraries of these parts, and screening desirable candidates. Additionally, this course aims to train students in reading, analyzing, and discussing materials from academic research articles.

Major Topics:

- Protein structure and biochemistry
- Experimental methods for studying proteins
- Methods for predicting protein structure
- Strategies of constructing mutant libraries
- Screening methods: phage display
- Screening methods: cell surface display
- Screening methods: cell-free display
- Case study: engineering in vivo systems for site-directed unnatural amino acid incorporation
- Case study: rational design to modify ligand specificity in allosteric response
- Case study: computational design of ligand-binding protein
• Case study: coevolutionary model-based modulation of protein-protein interactions

**Textbook:**
The following two textbooks are recommended but not necessary to purchase. Class notes and research articles will be provided to students as essential course materials.


**Specific goals for the course:**
Specific outcomes of instruction: Upon successful completion of this course, students will understand strategies of designing biological macromolecules. They will understand a range of broadly used approaches for modifying proteins and creating mutant libraries. They will also gain the knowledge of state-of-art methods for engineering components with desirable properties.

**Evaluation:** Homework will be assigned in class. There will be one group presentation, in-class quizzes, and a final paper and presentation. The grading policy will be as follows:

- Group presentation: 40%
- Quizzes: 20%
- Final paper and presentation: 40%

Grading scale:
A – 90-100%
B – 80-89%
C – 70-79%
D – 60-69%
F - < 60%
This scale may be lowered at the instructor’s discretion (but not raised).

**Policy Statements**

**A. Academic Integrity Standards and Consequences.** According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

**B. ADA Accommodation Statement.** UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA
will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one’s specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website at disability.unt.edu.

C. Course Safety Procedures (for Laboratory Courses; this course does not consist of a laboratory session). Students enrolled in laboratory courses are required to use proper safety procedures and guidelines as outlined in UNT Policy 06.038 Safety in Instructional Activities. While working in laboratory sessions, students are expected and required to identify and use proper safety guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions and hot and cold products. Students should be aware that the UNT is not liable for injuries incurred while students are participating in class activities. All students are encouraged to secure adequate insurance coverage in the event of accidental injury. Students who do not have insurance coverage should consider Standard Syllabus Statements Related Policy 06.049 Course Syllabi Requirements obtaining Student Health Insurance. Brochures for student insurance are available in the UNT Student Health and Wellness Center. Students who are injured during class activities may seek medical attention at the Student Health and Wellness Center at rates that are reduced compared to other medical facilities. If students have an insurance plan other than Student Health Insurance at UNT, they should be sure that the plan covers treatment at this facility. If students choose not to go to the UNT Student Health and Wellness Center, they may be transported to an emergency room at a local hospital. Students are responsible for expenses incurred there.

D. Emergency Notification & Procedures. UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Blackboard for contingency plans for covering course materials.