Course Information

Introduction to Protein Engineering
BMEN 6377.001
EEBM 7V87.001

Professor Contact Information

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Content

OVERVIEW OF THE COURSE

Course Description
Development of proteins with practical utility will be discussed using examples and case studies taken from the current literature.

Course Pre-requisites, Co-requisites, and/or Other Restrictions
None

Course Times
Tuesdays and Thursdays 11:30 AM – 12:45 PM in ECSN 2.126

Required Textbooks and Materials
Sheldon Park and Jennifer Cochran. Protein Engineering and Design. CRC Press, 2010
Notes and electronic documents provided in class and website.

Suggested Course Materials

Any Biochemistry Textbooks
Examples: Berg Jeremy, John Tymoczko, and Lubert Stryer. *Biochemistry*. 5th ed. New York, NY: W.H. Freeman and Company, 2006

Selected Chapters from
Lodish et al, *Molecular Cell Biology.*6th ed. New York, NY: W.H. Freeman and Company, 2007

Stefan Lutz and Uwe Bornscheuer. *Protein Engineering Handbook.* Wiley-VCH, 2006

Course Web Site: The eLearning course web site contains this syllabus and other useful links for the course. Log in using the information on p10.

STUDENT LEARNING OBJECTIVES/OUTCOME

This course was designed in the hope that, by its end, you will:

1. Understand principles and procedures of various protein engineering techniques.
2. Learn examples of proteins developed using these techniques
3. Learn how to interpret data obtained using these techniques in scientific articles.
4. Gain working knowledge of how to create a basic research plan that include protein engineering techniques

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ASSESSMENT AND ASSIGNMENT

1. Midterm Quiz: 30 %
2. In-class Presentation: 20 %
3. Assignment: 10%
4. Final Exam: 30%
5. Participation: 10% of course grade

   You will learn much better and will enjoy this course more if you take an active role in this course. Regular attendance in lectures is required. 10% of your course grade will be based on your participation in class discussion and attendance at lectures.

LIST OF LECTURES AND ASSIGNMENT

Module 1: Intro/Review

Week 1: Aug 25

Introduction and course overview
Protein Structure and Function review

Module 2: Directed Evolution Strategy

Week 2: Aug 30

Ch 1 Phage Display Systems
Sep 1
Presentation 1: Phage Display Systems
Ch 2 Cell Surface Display Systems

Week 3: Sep 6

Ch 2 Cell Surface Display Systems
Ch 3 Cell Free Display System
Sep 8
Ch 3 Cell Free Display System

Week 4: Sep 13

Presentation 2: Cell Surface Display Systems
Ch 4 Library Construction
Sep 15
Ch 4 Library Construction

Week 5: Sep 20

Presentation 3: Cell Free Display Systems
Ch 5 Alternative Scaffolds
Sep 22

Ch 5 Alternative Scaffolds

Week 6: Sep 27
Presentation 4: Alternative Scaffolds
Ch 6 Combinatorial Enzyme Engineering
Sep 29
Ch 6 Combinatorial Enzyme Engineering

Week 7: Oct 4
Mid Term Quiz

Module 3: Protein Engineering Examples
Week 7: Oct 6
Ch 9 Protein Engineering using noncanonical amino acids

Week 8: Oct 11/Oct 13 Lab 1-Unnatural Amino Acid (will move to different time)

Week 9: Oct 18
Presentation 5: Protein Engineering using noncanonical amino acids
Enzyme and Biosensor engineering
Oct 20
Enzyme and Biosensor engineering

Week 10: Oct 25
Presentation 6: Biosensor Engineering
Antibody Engineering 1
Oct 27
Antibody Engineering 2

Week 11: Nov 1
Ch 7 Engineering of Therapeutic Proteins
Nov 3
Ch 8 Protein Engineered Biomaterials

Module 4: Knowledge based protein design
Week 12: Nov 8
Presentation 7: Protein Engineered Biomaterials
Ch 10 Computer Graphics
Nov 10
Ch 11 Knowledge-based Protein Design

Week 13: Nov 15/Nov 17
Lab2-Computational design

Week 14: Nov 21

Presentation 8: Computational Design

Selected topics in Computational Design

Nov 24

No Class-Thanksgiving Holiday

Week 15: Nov 29

Selected topics in Computational Design

Dec 1

Flex Day, Review

Final: during week of Dec 12-16 Week

THE INSTRUCTOR

Hyun-Joo Nam was born and raised in South Korea. She received her B.S. and M.E. at the Seoul National University, Seoul, Korea, and Ph. D. at Harvard University, Cambridge, MA. She did her post-doctoral research at Harvard University until she joined University of Florida, Gainesville, FL as a research faculty. Her research focuses are primarily on elucidations of interactions involving virus, protein, and DNA. She combines the methods of crystallography, biochemistry and molecular modeling to study molecules involved in gene expression controls in cancer cells and virus particles for gene delivery systems. The ultimate goal is to correlate structure to function for the development of therapeutic treatment of disease.

SUPPLEMENT INFORMATION

Grading Policy

Grade	Description	Grade Points per Semester Hour
A+		4.00
A	Excellent	4.00
A-		3.67
B+		3.33
B	Good	3.00
B-		2.67
C+		2.33
C	Fair	2.00
C-		1.67
D+		1.33
D	Poor	1.00
D-		0.67
F	Failure	0.00
I	Incomplete	
CR	Credit	

NC No Credit

Course & Instructor Policies

Your main goal in this course is to understand protein engineering techniques and their applications. It is a vast and fast developing area, and you will be helped by participating in all of the activities: lectures, labs, discussion, and assignments. Regular attendance in lectures and lab is required. 10% of your course grade will be based on your participation in class discussion and attendance at lectures.

Technical Support

If you experience any problems with your UTD account you may send an email to: assist@utdallas.edu or call the UTD Computer Helpdesk at 972-883-2911.

Field Trip Policies
Off-campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm. *Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.*

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD printed publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Series 50000, Board of Regents, The University of Texas System,* and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting

the rules and regulations (SU 1.602, 972/883-6391) and online at http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-HOPV.html

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic Dishonesty, any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Copyright Notice

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owner's rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institution's copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final.

The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities equal educational opportunities. Disability Services provides students with a documented letter to present to the faculty members to verify that the student has a disability and needs accommodations. This letter should be presented to the instructor in each course at the beginning of the semester and accommodations needed should be discussed at that time. It is the student's responsibility to notify his or her professors of the need for accommodation. If accommodations are granted for testing accommodations, the student should remind the instructor five days before the exam of any testing accommodations that will be needed. Disability Services is located in Room 1.610 in the Student Union. Office hours are Monday – Thursday, 8:30 a.m. to 6:30 p.m., and Friday 8:30 a.m. to 5:00 p.m. You may reach Disability Services at (972) 883-2098.

Guidelines for documentation are located on the Disability Services website at http://www.utdallas.edu/disability/documentation/index.html

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

HOW TO LOGIN TO THE BMEN 6377.001, EEBM 7V87.001 WEBSITE

All students are encouraged to enroll in the course web site. This will contain

1. Announcements
2. All the information in the syllabus
3. Lecture slides
4. Assignments

Logging in to eLearning

1. Go to http://elearning.utdallas.edu
2. Click **Academic** button
3. Click the **Login** button
4. Enter your user name and password (Your university ID and PIN)
5. You will be taken to the My Courses page

6. Click EEBM-7V87 - EEBM 7V87 001: INTRODUCTION TO PROTEIN ENGINEERING - F10

   Or BMEN-6377 - BMEN 6377 001: INTRODUCTION TO PROTEIN ENGINEERING - F10

7. Browse the contents.

These descriptions and timelines are subject to change at the discretion of the Professor.