

ChBE/BMED/Chem 4803/8803 – Protein Engineering
Fall 2012 – MWF 2:05-2:55 PM
ES&T L1105

Instructor:

Professor Julie Champion

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Office hours: Mondays & Wednesdays noon-1pm, by appointment

Course Objectives:

1. To learn the theory and practice of a variety of protein engineering methods.
2. To learn specific examples of engineered proteins and their applications.
3. Apply this knowledge to critically analyze protein engineering schemes in the current literature.
4. Gain the skills to design a basic protein engineering experiment.

Prerequisites: Chem 3511 or 4511 (Biochemistry)

Text: Protein Engineering and Design. Sheldon Park & Jennifer Cochran. CRC Press, 2010. Supplemented with articles from recent literature.

Web: Course material, homework assignments, announcements and grades will be posted on T-square (<http://www.t-square.gatech.edu>). Check T-square regularly.

Attendance: Attendance is expected. Class discussion is a critical component and all students should participate every day. There are no wrong answers in discussion and everyone's opinion is respected. Class participation is included in final grades, one point given for each participation.

Office Hours: Dr. Champion will hold office hours in L1236 at times that are convenient to the most students. Please stop by to discuss critique articles, questions about the course, and especially the design project.

Grading Scheme:

Individual Critiques (10)	200	A > 535 pts
Group Critique (1)	40	B > 475 pts
Class Participation	30	C > 415 pts
Design Project	200	D > 355 pts
Final Exam	125	F < 355 pts

Homework: Homework is in the form of journal article critiques, due almost every week. Please see attachment for more information. All critiques will be done individually except for one, which will be done with your group.

Projects: Students will complete a design project in groups of two people. More details will be provided during the semester.

Exams: A final exam will be given in this class, part closed notes and part open notes. The exam will involve critical thinking and analysis of protein engineering methods learned in class.

Honor Code: Students are expected to follow the Georgia Tech Honor Code at all times.

<http://www.honor.gatech.edu>

Copying from other students, web sites or any other form of word is considered an honor code violation and will have consequences. Please see the instructor if you have any questions.

Tentative Course Schedule -- Protein Engineering -- ChBE/BMED/Chem 4803/8803 -- Fall 2012

Week	Day	Date	Reading	Assignment Due	Topic
1	M	20-Aug			Course Introduction & Literature Skills
	W	22-Aug			Recombinant Protein Technology
	F	24-Aug			Protein Chemistry & Structure
2	M	27-Aug		Individual Critique 1	Protein Structure & Characterization
	W	29-Aug	Ch 1, 2		Protein Evolution: Phage & Cell Surface Display
	F	31-Aug	Ch 3		Protein Evolution: Cell Free Display
3	M	3-Sep			NO CLASS -- Labor Day
	W	5-Sep	Ch 4	Individual Critique 2	Protein Evolution: Library Creation & Screening
	F	7-Sep			Case Study: Fluorescent Proteins & Molecular Probes
4	M	10-Sep	Ch 5		Engineered Proteins: Adhesion Proteins
	W	12-Sep		Group Critique 1	Protein Evolution: Literature Discussion
	F	14-Sep	Ch 6		Engineered Proteins: Enzymatic Proteins
5	M	17-Sep			Engineered Proteins: Biomimetic Proteins
	W	19-Sep		Group Critique 2	Engineered Proteins: Literature Discussion
	F	21-Sep			Engineered Proteins: Functional Peptides
6	M	24-Sep			Engineered Proteins: Functional Peptides
	W	26-Sep		Group Critique 3	Engineered Proteins: Literature Discussion
	F	28-Sep	Ch 10		Computational methods: Sequence & Graphical Analysis
7	M	1-Oct	Ch 11		Knowledge-based design
	W	3-Oct	Ch 12	Individual Critique 3	Computational Design: Molecular force fields
	F	5-Oct	Ch 13		Computational Design: Rotamer Libraries
8	M	8-Oct			Case Study: Computational Design FoldIt
	W	10-Oct			<u>Design Project Information</u>
	F	12-Oct		Group Critique 4	Computational Design: Literature Discussion
9	M	15-Oct			NO CLASS -- Fall recess
	W	17-Oct	Ch 7		Engineered Therapeutic Proteins: Antibodies
	F	19-Oct			Guest Lecture: Dr. Kevin Boulware
10	M	22-Oct		Design Proposal	Engineered Therapeutic Proteins: Growth factors
	W	24-Oct			Engineered Therapeutic Proteins: Vaccines
	F	26-Oct		Group Critique 5	Engineered Therapeutic Proteins: Literature Discussion
11	M	29-Oct			NO CLASS -- Independent project literature research
	W	31-Oct			NO CLASS -- Independent project literature research
	F	2-Nov	Ch 9		Protein Modifications: Non-natural amino acids
12	M	5-Nov			Protein Modifications: Non-natural amino acids
	W	7-Nov		Group Critique 6	Protein Modifications: Literature Discussion
	F	9-Nov			Protein Modifications: Non-natural amino acids
13	M	12-Nov			Protein Modifications: Post-translational modifications
	W	14-Nov		Group Critique 7	Protein Modifications: Literature Discussion
	F	16-Nov	Ch 8		Engineered Protein Materials: Modular Design
14	M	19-Nov			Engineered Protein Materials: Mechanical Properties
	W	21-Nov		Group Critique 8	Engineered Protein Materials: Literature Discussion
	F	23-Nov			NO CLASS -- Thanksgiving
15	M	26-Nov			Engineered Protein Materials: Self-Assembly
	W	28-Nov			Engineered Protein Materials: Structural Diversity
	F	30-Nov		Design Reports	Design presentations
16	M	3-Dec			Design presentations
	W	5-Dec			Design presentations
	F	7-Dec			Design presentations
	W	12-Dec			FINAL EXAM 11:30 AM - 2:20 PM