

		<u>DATE</u>	<u>OUTLINE</u>	<u>POWERPOINT</u>	<u>TOPICS</u>	<u>DALE AND SCHANTZ (3rd Ed.)</u>	<u>STRACHAN & READ</u>	
1	9/6							
2	9/11		<u>Topic 1</u>		BASIC NUCLEIC ACID MANIPULATION DNA purification; DNA synthesis; Enzymes; Electrophoresis; Sequencing; Hybridization	29-44, 131-7, 287-8, 94-102, 107-8	174-183, 222-224, 183-186	<u>Readings, Articles, and Websites</u>
3	9/13		Actions	Topic1.pdf				
4	9/18			Actions				
5	9/20				DNA CLONING			
6	9/25		<u>Topic 2</u>		Plasmid cloning, other vectors, libraries,	25-9, 44-74, 75-93, 106-8, 218-25	162-167, 170-174	<u>Readings, Articles, and Websites</u>
7	9/27				PCR			
8	10/2		Actions	Topic2.pdf	Ligase-free cloning, Site-directed mutagenesis			

9	10/4		Actions				
10	10/9						
11	10/11						
12	10/16	Topic 3 Actions	Topic 3.pdf Actions	DNA MAPPING, GENOME SEQUENCING, 2ND GENERATION SEQUENCING Clone contigs; Hierarchical sequencing; Genome shotgun sequencing; 2 nd generation sequencing	262-3, 137-40, 229-31, 231-42	203-213, 218-219, 186-196	<u>Readings, Articles, and Websites</u>
13	10/18						
14	10/23	Topic 4 Actions	Topic 4.pdf Actions	GENE CHARACTERIZATION Empirical definition of RNA & protein products; Sequence-based prediction of gene products; Measuring gene expression	185-7, 169-74, 146-8, 243-50	214-218, 219-221, 224-229	<u>Readings, Articles, and Websites</u>
15	10/25			Mid-Term Exam			

PART II: PROFESSOR Songtao Jia (songtao.jia@columbia.edu)
Office hours on Fridays 4-5pm 1110 Fairchild.

Date	Topic	slides	Dale & Schantz	Reading material
30-Oct	Characterizing proteins	Biotech_Jia_1-1.pdf Actions		Biochemistry_Chapter3-1 Actions MBoC_Chapter8-1.pdf Actions

				protein-assay-technical-ha Actions Protein methods Links to an ext
1-Nov	Characterizing proteins	Biotech Jia 2-1.pdf Actions		
6-Nov	No class. Academic holiday			
8-Nov	Characterizing proteins	Biotech Jia 3-1.pdf Actions		2008NobleChemistryPrize Actions
13-Nov	producing proteins	Biotech Jia 4.pdf Actions		protein-expression-handbo Actions
15-Nov	producing proteins	Biotech Jia 5-2.pdf Actions		
20-Nov	Producing proteins	Biotech Jia 6.pdf Actions		Reprograming genetic cod Actions
22-Nov	No class. Academic holiday			
27-Nov				

29-Nov	Analyzing protein function	Biotech_Jia_7.pdf Actions		
4-Dec	Analyzing protein function	Biotech_Jia_8.pdf Actions		Protein-Interactions-Hand Actions 2018NobelChemistryPrize PhageDisplay.pdf Actions Phage display review.pdf Actions
6-Dec	Applications of Biotechnology	Biotech_Jia_9.pdf Actions		CRISPR genome editing.p Actions
11-Dec	Review	Biotech_Jia_10.pdf Actions		

Expectations and Organization:

The "Syllabus" tab contains links to Notes and Slides for each topic, as well as links to websites and documents with information for (voluntary) further reading. You may wish to download (and perhaps print) Notes and Slides prior to class sessions, so you can annotate them during class. Sometimes, Slides are updated just before or during presentation of a topic, so it may be best to download or print "just in time".

Assignments will be posted on Wednesdays. During the first half of the course, five assignments will be set weekly from the second Wednesday onwards. Answers should generally be submitted by the following Wednesday (class time). The first assignment will be short and due the following Monday. The fifth assignment will only be due 12 days later. Both adjustments are to accommodate exam dates in another course commonly taken at the same time. Assignments will be graded and annotated electronically by the next class meeting, and "model" answers with additional comments spurred by student answers will be posted at that time.

"Discussions" (Courseworks tab) will be available for you to introduce yourselves, facilitate study group formation and post questions in different categories, to which other students may respond; the instructor and TAs will routinely check these and respond. You are encouraged to post all questions about science in "Discussions" so that the whole class can benefit from the questions and answers. Any questions or discussions involving instructors through other channels will also be spread to the whole class (most often in Model Answers) when deemed to be instructive for others.

Grading: There will be eight graded assignments in total, each generally worth 5% of your final grade for a total of 40% (the first assignment is short and weighted less- just 2%). There will additionally be a 70 minute mid-term exam (25% of total grade) concerning material in the first half of the course and a 3h Final exam (35% of the total) concerning only the second half. These will take the form of conventional "in-class" closed-book exams. In past years, achieving a grade that exceeds the mean of the whole class always translated to a grade of B+ or higher.

Learning objectives and methods:

The course has a strong focus on "learning by doing" and "principles", with the hope of facilitating long-term understanding and the ability to pursue further learning in this area independently. The "doing" includes asking and responding to questions during class and a series of graded out-of-class assignments. These assignments are generally designed to be challenging, in order to provoke careful thinking of how to apply general principles, and relevant to the realities of conducting biotechnology-related research. Collaboration through study groups, attendance of voluntary TA-led recitation sessions and early communication with the instructor to resolve potential ambiguities in any questions are encouraged; some sample questions will be discussed first in class to provide extra guidance. Major objectives are to understand, employ and explain key principles underlying almost all DNA-based approaches, as well as appreciating how the design of a variety of more sophisticated biotechnology approaches achieves the intended purpose. Meeting these objectives should provide a strong basis for facilitating or improving personal conduct of molecular biology research, appreciating how technology development proceeds and what biotechnology can accomplish. The course design aims to allow all class members to advance towards these objectives, facilitated by peers, TAs and instructors, even though past practical experience and career objectives will surely be quite disparate.

