BI8 course syllabus, WI 2016

Lec #	Date	Topic	Problem Set	Lecturer	Reading (plus specific papers to be added)
1	Tu, Jan 5	The genome: codes, organization, expression vs. inheritance		EVR	Alberts, Ch.1, Ch.4: pp. 173-186 & 216-236
	Wed, Jan. 6-Fri, Jan 8	**Dissecting molecular biology research papers**		EVR	chalktalks & examples
2	Th, Jan 7	Nucleic acid structures: chemistry, space, time		EVR	Alberts, Ch. 4: pp. 173-186 & 216-236; Ch. 6 pp. 299-301; and panel 2-6 (see panels 2-1, 2-2, 2-3 for background)
3	Tu, Jan 12	RNA transcription and splicing	PS #1 out, <mark>due back Jan 21</mark>	Katalin Fejes-Toth	Ch. 6: pp. 301-333
	Wed, Jan 13-Fri, Jan 15	**"Bootcamps": molecular biology techniques & interpretation**			Ch. 8: pp. 453-455, 463-485 & 501-504
4	Th, Jan 14	How do we know what we know? Nucleic acid technologies and strategy		EVR	Ch. 8: 463-485 & 501-504
5	Tu, Jan 19	How we know what we know, cont'd, and intro to protein structure code	<mark>In-class quiz</mark>	EVR	
6	Th, Jan 21	Making proteins from genes: mRNA & translation		EVR	Ch. 6: pp. 333-366; and for post-transcriptional regulation, Ch. 7 pp. 413-428
7	Tu, Jan 26	Protein structure: motifs and domains	PS #2 out, <mark>due back Feb 2</mark>	EVR	Ch. 3, pp. 109-134; panel 3-1

8	Th, Jan 28	Quantitating biological interactions and reactions		EVR	Ch. 3, pp. 134-154; panel 2-7; panel 3-2
9	Tu, Feb 2	Components of transcriptional regulatory machines: bacterial modes of regulation, part 1		EVR	Ch. 7: pp. 369-383 Watson et al, Ch. 16, 547-577
10	Th, Feb 4	Bacterial modes of regulation, part 2		EVR	Watson et al, Ch. 16, 547-577; Yanofsky, Trends Genet 20: 367-274 2004;
	Sat, Feb 6	**Midterms out**			
11	Tu, Feb 9	Quantitative aspects of transcription factor binding and gene regulatory circuit design		EVR	Calculations of transcription factor binding handout Schleif 2010 review Systems biology handout
	Wed, Feb 10	**Midterms due in 212 Kerckhoff, 12-1 pm** *to be graded by Feb 17*			
12	Th, Feb 11	Replication strategies and control		EVR	Ch. 5
13	Tu, Feb 16	Genomic integrity: mutation & error repair	PS #3 out, due back Feb 23	EVR	Ch. 5
14	Th, Feb 18	Epigenetics and gene regulation: transcriptional regulation in multicellular eukaryotes		EVR	Alberts Ch.4 pp.187-207; Ch. 7, pp. 369-407
15	Tu, Feb 23	Signal-dependence, higher order combinatorial action, overcoming epigenetic barriers & TF binding		EVR	Ch. 7, pp. 369-407 and Papers from literature
16	Th, Feb 25	Multicellular specialization	In-class quiz	EVR	Ch. 7, pp. 369-407; Ch. 21, pp. 1147-1166; and

		and developmental gene networks	PS #4 out, <mark>due back Mar</mark> 3		Papers from literature
17	**Tu, Mar 1**	RNA as a regulatory molecule: miRNA & silencing ncRNAs		EVR	**Ch. 7:** pp. 407-415, 429-436; Papers from literature
18	**Th, Mar 3**	RNA world: structure, enzymatics and possible origins		EVR	Alberts et al. Ch. 7 pp. 413-428 – Chapter 6, pp. 319-325 – Chapter 6, pp. 346-347 – Chapter 6, pp. 362-366
19	**Tu, Mar 8**	Review/ test yourself quiz		TAs	
	Fri, Mar 11	**Finals out**			
	Tu, Mar 15	<mark>**Finals due**</mark>*, to be graded by Fri Mar 19*			
	Mon, Mar 21	**Grades submitted**			
	SCHEDULE OF CHALLENGE QUESTIONS				6-8 questions to be chosen by 4-6 students/sect-wk
	Jan20-22	Challenge question session 1			questions distributed Th Jan 14
	Jan27-29	Challenge question session 2			questions distributed Th Jan 21
	Feb 3-5	Challenge question session 3			questions distributed Th Jan 28
	<mark>**Feb 10-12**</mark>	<mark>Challenge question session 4</mark>	*midterm wk*		<mark>questions distributed Mon Feb</mark> 8
	Feb 17-19	Challenge question session 5			questions distributed Th Feb 11
	Feb 24-26	Challenge question session 6			questions distributed Th Feb 18
	Mar 2-4	Challenge question session 7			questions distributed Th Feb 25
	Mar 9-11	final catch up and **REVIEW SESSIONS**			

General scope of Problem Sets:

Problem sets are based on critical reading of papers from the primary research literature.

Problem set 1: Mostly molecular biology of essential gene structure; detection, purification, isolation, analysis of nucleic acids and relationship of structure to information content

Problem set 2: Translation, protein structure, enzyme activity; relationship of DNA and RNA sequence to protein structure

Problem set 3: Bacterial modes of gene regulation; DNA replication & recombination

Problem set 4: Gene regulation in complex multicellular organisms; information processing at the regulatory level; gene networks and differentiation or signal response

Challenge Questions

After week two, each section meeting will consist of a program of student presentations on the subject of "challenge questions" that have been assigned to the class ~5 days previously. Every student in the class needs to present his/her answers to a challenge question in his/her section twice during the term, once before the midterm and once after the midterm, and will sign up for the dates of these presentations at the beginning of the course. Each week, lists of 6-8 possible questions will be posted by the weekend and students who are scheduled to present the coming week will select questions they wish to present on a first come, first serve basis. In the sections themselves, challenge question presentations are to be 5 min long chalk talks (no powerpoint) with 5 min for questions afterwards. Students presenting each week will quickly summarize the questions they have chosen and then explain the answer succinctly but intelligently without reading from notes. Challenge questions may have relatively straightforward answers or be much more open ended. Each section will consist of 4-6 of these presentations. Challenge questions that have already been posed to the class are to be available to the whole class throughout the term, because they can be valuable study aids.