HG541 Fall Term
Molecular Genetics 9:00-10:00 MWF

Classrooms

Unless otherwise specified, all lectures are in the North Lecture Hall (NLH) in Med Sci II. Please see the separate document for discussion assignments and rooms. Exams are take-home.

Reading materials

Chapters from the Watson text are for your reference if you require background and review. Other materials for lectures are recommended reading but not required. Primary research papers provided for discussions (in blue) are *required reading* in order to answer assignment questions and participate in discussions.

2017 Syllabus

Day	Date	Title	Module Leader / Reading Materials
Module 1		**Introduction and basic concepts**	**Tom Wilson**
Wed	Sep. 6	Introduction: From Mendel to molecules	Watson 7th ed. Ch. 1,2
Fri	Sep. 8	Nucleic acids and the central dogma	Watson 7th ed. Ch. 2,3,4,5,(6),(8)
Mon	Sep. 11	Recombinant DNA technology GUEST LECTUER: Sundeep Kalantry	Watson 7th ed. Ch. 7
Wed	Sep. 13	Genetic nomenclature / reading papers GUEST LECTUER: John Moran	
Fri	Sep. 15	Discussion	
Module 2		**Replication and mutagenesis**	**Tom Wilson**
Mon	Sep. 18	Replication fidelity mechanisms	Watson 7th ed. Ch 9,10; App. 1 (yeast) Ganai et al. Mol Cell 62:745 (2016) Prioleau et al. Genes Dev 30:1683 (2016)
Wed	Sep. 20	DNA damage and repair	
Fri	Sep. 22	Discussion	
Module 3		**Meiosis and recombination**	**Martin Arlt**
Mon	Sep. 25	Meiosis and homologous recombination	Watson 7th ed. Ch. 11 Szostak et al. Cell 33:25-35 (1983)
Wed	Sep. 27	Illegitimate recombination	Boulton and Jackson EMBO 15:5093 (1996)
Fri	Sep. 29	Discussion	
Module 4		**Genomes and chromosomes**	**Jake Mueller**
Mon	Oct. 2	Structure of the genome	Watson 7th ed. Ch. 8
Wed	Oct. 4	Comparative genomics	Rogers and Gibbs. Nat Rev Genet 15:347-59 (2014)
Fri	Oct. 6	Chromosomes	
Mon	Oct. 9	Discussion	
Wed	Oct. 11	Midterm Exam #1	Modules 2-4 (not 1)
Module 5		**Genes and transcription**	**Jake Mueller**
Fri	Oct. 13	Genes and basal transcriptional machinery	Watson 7th ed. Ch. 13
Mon	Oct. 16	NO CLASS – FALL BREAK	
Wed	Oct. 18	Regulatory transcriptional machinery I:	Watson 7th ed. Ch. 18,19

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		Gene promoters, enhancers and silencers	
Fri	Oct. 20	Regulatory transcriptional machinery II: Transcription factors and transcriptional control	
Mon	Oct. 23	Discussion	
Module 6		**RNA processing and translation**	**Sue Hammoud**
Wed	Oct. 25	Splicing	Watson 7th ed. Ch. 14, pp. 467-500
Fri	Oct. 27	Polyadenylation and other forms of post-transcriptional regulation	Watson 7th ed. Chapter, 13 pp. 458-462; Chapter 14, pp. 500-505; Chapter 20, pp. 711-727.
Mon	Oct. 30	Translation	Watson 7th ed. Chapter 15
Wed	Nov. 1	Discussion	
Module 7		**Epigenetics: Chromatin**	**Sundeep Kalantry**
Fri	Nov. 3	Epigenetic inheritance / DNA methylation	Watson 7th ed. Ch. 8,19 Bonasio et al. Science 330:612-616 (2010) Kohli and Zhang Nature 502:472-9 (2013)
Mon	Nov. 6	Histone modifications	Suganuma and Workman Ann Rev Biochem 80:473-99 (2011)
Wed	Nov. 8	Long non-coding RNAs	Kung et al. Genetics 193:651-669 (2013)
Fri	Nov. 10	Discussion	
Module 8		**Epigenetics: Small RNAs**	**Sundeep Kalantry**
Mon	Nov. 13	RNA interference	Watson 7th ed. Ch. 20 Meister Nat Rev Gen 14:447-459 (2013)
Wed	Nov. 15	Midterm Exam #2	Modules 5-7
Fri	Nov. 17	microRNAs and post-transcriptional gene silencing	Huntzinger Nat Rev Gen 12:99-110 (2011)
Mon	Nov. 20	piRNAs and endo-siRNAs in gene silencing	Watanabe Mol Cell 56:18-27 (2014) Grewal Curr Op Gen Dev 20:134-141 (2010)
Wed	Nov. 22	Discussion	
Fri	Nov. 24	NO CLASS – THANKSGIVING	
Module 9		**Integrative genomics / Genetic networks**	**Alan Boyle**
Mon	Nov. 27	Chromatin architecture	Watson 7th ed. Ch. 21,22
Wed	Nov. 29	Transcriptome and proteome	
Fri	Dec. 1	ENCODE and modENCODE	
Mon	Dec. 4	Discussion	
Module 10		**Repetitive DNA and transposable elements**	**John Moran**
Wed	Dec. 6	Genomic abundance: DNA transposons and LTR retrotransposons	Watson 7th ed. Ch. 12, pp. 393-410, 414-416, 420.
Fri	Dec. 8	Poly (A) retrotransposons (SINEs and LINEs)	
Mon	Dec. 11	Discussion	

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Day	Date	Title	Module Leader / Reading Materials
Fri	Dec. 15	(Final) Exam #3 Date subject to change!	Modules 8-10