

**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
<b>Module 1</b>		<b>Introduction and basic concepts</b>	<b>Tom Wilson</b>
Wed	Sep. 6	Introduction: From Mendel to molecules	Watson 7 <sup>th</sup> ed. Ch. 1,2
Fri	Sep. 8	Nucleic acids and the central dogma	Watson 7 <sup>th</sup> ed. Ch. 2,3,4,5,(6),(8)
Mon	Sep. 11	Recombinant DNA technology GUEST LECTUER: Sundeep Kalantry	Watson 7 <sup>th</sup> ed. Ch. 7
Wed	Sep. 13	Genetic nomenclature / reading papers GUEST LECTUER: John Moran	
Fri	Sep. 15	Discussion	
<b>Module 2</b>		<b>Replication and mutagenesis</b>	<b>Tom Wilson</b>
Mon	Sep. 18	Replication fidelity mechanisms	Watson 7 <sup>th</sup> 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	
<b>Module 3</b>		<b>Meiosis and recombination</b>	<b>Martin Arlt</b>
Mon	Sep. 25	Meiosis and homologous recombination	Watson 7 <sup>th</sup> 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	
<b>Module 4</b>		<b>Genomes and chromosomes</b>	<b>Jake Mueller</b>
Mon	Oct. 2	Structure of the genome	Watson 7 <sup>th</sup> 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)
<b>Module 5</b>		<b>Genes and transcription</b>	<b>Jake Mueller</b>
Fri	Oct. 13	Genes and basal transcriptional machinery	Watson 7 <sup>th</sup> ed. Ch. 13
Mon	Oct. 16	NO CLASS – FALL BREAK	
Wed	Oct. 18	Regulatory transcriptional machinery I:	Watson 7 <sup>th</sup> ed. Ch. 18,19

Day	Date	Title	Module Leader / Reading Materials
		Gene promoters, enhancers and silencers	
Fri	Oct. 20	Regulatory transcriptional machinery II: Transcription factors and transcriptional control	
Mon	Oct. 23	Discussion	
<b>Module 6</b>		<b>RNA processing and translation</b>	<b>Sue Hammoud</b>
Wed	Oct. 25	Splicing	Watson 7 <sup>th</sup> ed. Ch. 14, pp. 467-500
Fri	Oct. 27	Polyadenylation and other forms of post-transcriptional regulation	Watson 7 <sup>th</sup> ed. Chapter, 13 pp. 458-462; Chapter 14, pp. 500-505; Chapter 20, pp. 711-727.
Mon	Oct. 30	Translation	Watson 7 <sup>th</sup> ed. Chapter 15
Wed	Nov. 1	Discussion	
<b>Module 7</b>		<b>Epigenetics: Chromatin</b>	<b>Sundeep Kalantry</b>
Fri	Nov. 3	Epigenetic inheritance / DNA methylation	Watson 7 <sup>th</sup> 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	
<b>Module 8</b>		<b>Epigenetics: Small RNAs</b>	<b>Sundeep Kalantry</b>
Mon	Nov. 13	RNA interference	Watson 7 <sup>th</sup> 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	
<b>Module 9</b>		<b>Integrative genomics / Genetic networks</b>	<b>Alan Boyle</b>
Mon	Nov. 27	Chromatin architecture	Watson 7 <sup>th</sup> ed. Ch. 21,22
Wed	Nov. 29	Transcriptome and proteome	
Fri	Dec. 1	ENCODE and modENCODE	
Mon	Dec. 4	Discussion	
<b>Module 10</b>		<b>Repetitive DNA and transposable elements</b>	<b>John Moran</b>
Wed	Dec. 6	Genomic abundance: DNA transposons and LTR retrotransposons	Watson 7 <sup>th</sup> ed. Ch. 12, pp. 393-410, 414-416, 420.
Fri	Dec. 8	Poly (A) retrotransposons (SINEs and LINEs)	
Mon	Dec. 11	Discussion	

**HG541**  
**Molecular Genetics**

Fall Term  
9:00-10:00 MWF

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

**Discussion attendance**

Attendance at your assigned discussion section is strictly required. Attendance will be taken and being absent will negatively impact your grade. If you anticipate an unavoidable absence, you must clear it by email with the course director one or more days before class. Acute illness or an emergency on the day of class are the only reasons you should be absent without prior notice, and in that case as soon as you are able please email the course director explaining your situation.

**Readings and assignments**

Each discussion section has one assigned primary research paper as required reading. After reading and thinking about the paper and the lectures in the module, complete the related assignment. Type in your answers using Word, then print the document and hand in a one-sided paper copy in class.

**Due dates and lateness policy**

Assignments are due at the beginning of class on the day of the discussion, i.e. at 9:10 AM. Late assignments will not be accepted, as answers will be discussed in class. If you know you will be absent the day of a discussion, turn your completed assignment in to a TA or instructor ahead of time.

**Open book policy and honor code**

You are allowed – and strongly encouraged! – to use whatever resources you want to help you understand the paper and complete the assignments, including working together and the internet. However, each student must complete their own assignment in their own words and make their own drawings. Evidence of plagiarism, such as students repeatedly handing in assignments with the same wording, spelling, etc., will result in a zero score for those students for those assignments.

**Discussion section student assignments (most frequent room listed – see exceptions below!)**

<u>Section 1</u> 6225 THSL	<u>Section 2</u> 6215 THSL	<u>Section 3</u> 5340 THSL	<u>Section 4</u> 6235 THSL	<u>Section 5</u> 6320 THSL
Alge, Olivia	Bouza, Alexandra	Apfelbaum, April	Atindaana, Edm.	Bailey, Lauren
Beil, Adelyn	Chase, Colby	Charpentier, John	Gensterblum-Miller	Bunn, Kaitlyn
Choi, Jae	Crawford, Ryan	Dang, Derek	Iyer, Gayatri	Chawla, Bahaar
Coit, Patrick	Cruz, Andrea	Gao, Yilin	Kim, Peter	Choi, Molly
Craig, Nathan	Drews, Joshua	Hilfrank, Kimberly	Knox, Charles	Close, Charlotte
Ertl, Henry	Gomez, Nicolas	Hochstetler, Jord.	Kuo, Molly	Hu, Hsiang-Yu
Jimenez, Jennifer	Jiang, Daohan	Kibui, Julie	Lenhart, Kelsey	Kunkel, Thaddeus
McMillan, Michael	Kerk, Samuel	Kinnear, Hadrian	Millar, Jess	Manninen, Matt.
Ozelius, Katherine	McShane, Ariel	Lapehn, Samanth.	Olson, Eli	McVeety, Kelsie
Schmitz, Lauren	Schaefer, Aman.	Michmerhuizen, A	Rygiel, Christine	Rai, Vivek
Serrano Zayas, C.	Stewart, Richard	Seemann, Lauren	Skulsky, Joseph	Vande Zande, P.
Slade, Hannah	Swanepoel, Callie	Shen, Xukang	Sobotka, Elise	Zheng, Xianing
VandeHaar, Peter	Williams, Aaron	Trombley, Jessica	Van den Goor, L.	Ziegler, Christine
Waller, TJ	Zhang, Hanrui	Trotter, Megan	Virgilio, Maria	Zima, Makenzie

**Discussion faculty leaders (most frequent room listed at top – see exceptions in red!)**

<b>Date</b>	<b>Module</b>	<b>Section 1 6225 THSL</b>	<b>Section 2 6215 THSL</b>	<b>Section 3 5340 THSL</b>	<b>Section 4 6235 THSL</b>	<b>Section 5 6320 THSL</b>
Fri Sep. 15	1 - Introduction and basic concepts	Moran	Arlt	Kopera	Wagnon <b>3755 MSII</b>	Lenk <b>3733 MSII</b>
Fri Sep. 22	2 - Replication and mutagenesis	Wilson	Arlt	Kopera	Wagnon	Lenk
Fri Sep. 29	3 - Meiosis and recombination	Wilson	Arlt	Kopera	Wagnon	Lenk
Mon Oct. 9	4 – Genomes and chromosomes	Mueller	Arlt	Kopera	Wagnon	Lenk
Mon Oct. 23	5 - Genes and transcription	Mueller	Arlt	Kopera	Wagnon	Lenk
Wed Nov. 1	6 - RNA processing and translation	Hammoud	Wagnon	Lenk	Arlt	Kopera
Fri Nov. 10	7 - Epigenetics: Chromatin	Kalantry <b>5320 THSL</b>	Wagnon <b>5330 THSL</b>	Lenk <b>3753 MSII</b>	Arlt <b>3755 MSII</b>	Kopera <b>3733 MSII</b>
Wed Nov. 22	8 - Epigenetics: Small RNAs	Kalantry	Wagnon	Lenk	Arlt	Kopera
Mon Dec. 4	9 – Integrative genomics / Genetic networks	Wilson	Boyle	Lenk	Arlt	Kopera
Mon Dec. 11	10 - Repetitive DNA and transposable elements	Moran	Wagnon	Lenk	Arlt	Kopera

THSL = Taubman Health Sciences Library  
 MSII = Medical Sciences II

**Getting the materials**

Please see the syllabus for the research papers for each discussion. As with all course materials, these papers and the related assignments will be posted on Canvas before the module begins.

**Answer keys**

For answers, login with your unickname at: [https://mimeeting.org/HG541?db=HG541\\_2017](https://mimeeting.org/HG541?db=HG541_2017)