MCB 100B Spring Syllabus: Biochemistry: Pathways, Mechanisms, and Regulation

Time & Location: Tuesday / Thursday 3:30 – 5:00 PM, 101 Barker Hall

Part A. Specificity and Signaling

Textbook resources:
1. The Molecules of Life by Kuriyan, Konforti & Wemmer. Chapters 12, 13 and 17. (The course will build on material covered in MCB 100A).
2. Lehninger’s Biochemistry, Chapter 12. Note: 5th, 6th, or 7th edition are acceptable. Chapter numbering below is based on 6th edition.

Lecture 1, Tue 1/18 (ZOOM). Second messenger and G protein-coupled receptor signaling. Lehninger Chap 12, 437-456
Lecture 2, Thur 1/20 (ZOOM). Receptor tyrosine kinases and protein-protein interaction networks. Lehninger Chap 12, 461-474
Lecture 3, Tue 1/25 (ZOOM) Binding affinity and specificity in molecular interactions. Analysis of binding with multiple targets. TMOL Chap 12, 531-548, Chap 13, 581-589
Lecture 4, Thur 1/27 (ZOOM) Protein-protein interactions, protein-nucleic acid interactions. TMOL Chap 13, 590-623
Lecture 5, Tue 2/1. Random walks, diffusion and Brownian motion. Chemotaxis, diffusion through ion channels. TMOL Chap 17, 787-801; TMOL Chap 11, 484-492
Lecture 8, Thur 2/10. Ion pumps and transporters. TMOL Chap 11, 482-496 & 517-523
Lecture 9, Tue 2/14 The transmission of action potentials in neurons. TMOL Chap 11, 474-475 & 497-517

Part B. Central Metabolism and Enzyme Principles

Textbook resources: Lehninger’s Biochemistry. Chapters 3, 6, 7, 10, 13, 14, 15, 16, 18, 19

Lecture 10, Thur 2/17. Introduction to Metabolism: Logic and pathways. Lehninger Chap 3 (review); Chap 6, 187-198

Midterm 1: Wed 2/16, 7-9pm 145 Dwinelle (Part A material only)

Lecture 11, Tue 2/22. Enzyme reaction mechanisms and cofactor function (I). Lehninger Chap 6, 213-225 & Chap 13, 501-526
Lecture 12, Thur 2/24. Enzyme reaction mechanisms and cofactor function(II) and introduction to glycolysis. Lehninger Chap 14, 533-545


Lecture 17, Tue 3/15. ATP synthesis and regulation. Lehninger Chap 731-744

Lecture 18, Thur 3/17. Amino acid metabolism, Lipids and glycogen Lehninger Chap 19, 744-750, Chap 18, 675-690 & Chap 10, 361-381

Spring Break: 3/22 – 3/26

Part C. Molecular Physiology Expanded
Textbook resources: Lehninger’s Biochemistry. Chapters 14, 15, 17, 18, 19, 20, 21, 22.

Midterm 2: Tues 3/29, 7-9 pm 10 Evans (Part B material only)

Lecture 19, Tue 3/29. The regulation and storage of sugar in the cell.
Reading: 7.1, (review) 12.2 (review), 14.4, 15.3, 15.4, 15.5

Reading: 3.3 (chromatography), 3.4 (mass spectrometry) 15.1, 15.2

Lecture 21, Tue 4/5. Fatty acid degradation.
Reading: 17.1, 17.2, 17.3

Lecture 22, Thur 4/7. Amino acid degradation and the urea cycle.
Reading: 18.1, 18.2, 18.3

Reading: 19.6, 19.7, 19.8, 19.9, 19.10

Reading: 20.1, 20.2, 20.3


Reading: 21.4 (isoprenoid section)

Reading: 23 (skim).

RRR Week: 5/4 – 5/8

Combined Midterm 3 and Final: Friday 5/13, 7-10 pm location TBD