Twelve Topics That Need to be Reviewed for CMBI-6606

Topics You Need to Know	Where to Go for Review

1. Main structural component for nucleic acid:
• Nitrogenous bases: Pyrimidines and purines
• Sugar
• Phosphate group
• Base+sugar: nucleoside (e.g. adenine+sugar=adenosine)
• Base+sugar+phosphate group: nucleotide (e.g. AMP)
• Hydrogen-bonding patters in the base pairs defined by Watson and Crick 5' to 3' synthesis, antiparallel
	• Online book: Chapter 1.2 and 2.2
	• Videos (each is about 1-minute long):
	  ○ http://www.youtube.com/watch?v=qy8dk5iS1f0
	  ○ https://www.youtube.com/watch?v=vU3DebLk_zI

2. Secondary structure of DNA and RNA –step and loop structures	• Good explanation in Wikipedia: https://en.wikipedia.org/wiki/Stem-loop • Very short video: https://www.youtube.com/watch?v=KBI69y2ziXw
3. Denaturation of DNA, how to monitor it, what is melting temperature, what kind of factor can affect the melting temperature	• 5-minute video: https://www.youtube.com/watch?v=YV4nonUsb2Q
4. DNA replication, main enzymes, primers, direction of DNA synthesis, Okazaki fragments	• 10-minute video: https://www.youtube.com/watch?v=Kmr2Vd_JzWU • Online book: Chapter 1.3

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5. RNA transcription, promoter, the main enzymes	• Online book Chapter 1.5 pages 18
6. Translation, main components, ribosome, code, codon, anti-codons, initial codon, stop codons	• Online book Chapter 1.5 pages 18-19
7. Genetic code, 20 amino acid, and basic characteristic of an amino acid	• Online book Chapter 1.5 page 19-21 • 5-minute video: https://www.youtube.com/watch?v=J0Oij7GBS3Q
8. Open reading frames and summary of topics 1-8	• Reading from Bioweb: http://bioweb.uwlax.edu/genweb/molecular/seq_anal/translation/translation.html • For a summary of Topics 1-8 plus an introduction to basic biotechnology, see the following 10-minute video: https://www.youtube.com/watch?v=W4mYwsr9gGE

9. Interrupted genomes (exons—introns) – gene structure, splicing, alternative splicing:	• Readings:
	  ○ https://www.ndsu.edu/pubweb/~mcclean/plsc731/transcript/transcript4.htm
	  ○ http://bitesizebio.com/10148/what-is-alternative-splicing-and-why-is-it-important/
	• 6-minute video: https://www.youtube.com/watch?v=3m7sraBh9z4

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10. Transcriptional factors, Consensus sequences	Readings: • Reading: https://www.khanacademy.org/science/biology/gene-regulation/gene-regulation-in-eukaryotes/a/eukaryotic-transcription-factors • Very good Wikipedia page for Consensus sequences: https://en.wikipedia.org/wiki/Consensus_sequence
11. Mutations and type of mutations Missense- nonsense- frameshift- insertion/deletion, duplication, translocation	• Reading: http://ghr.nlm.nih.gov/handbook/mutationsanddisorders/possiblemutations • 7-minute video: https://www.youtube.com/watch?v=eDbKocxKKsk
12. Basic molecular biology techniques: Restriction Enzymes, DNA separation and hybridization techniques, PCR and RFLP	• All topics for #12: Online book: Chapter 2 • Restriction enzymes: Online book Chapter 2 pages 48-51 and a 2-minute • DNA separation techniques: Online book Chapter 2 pages 50-52, • DNA hybridization techniques: Online book Chapter 2 pages 54-57 • PCR: Online book Chapter 2 pages 60-63 • RFLP: Online book: Chapter 2 pages 66-67 and a 1-minute video: https://www.youtube.com/watch?v=d2jEyO3hqRo