Chapter 11 -- Cell Communication

Local, Distant, Direct contact
Reception, Transduction, Response
Receptors
  G-protein-linked proteins
  tyrosine kinases -- multiple consequences
  ion channels
Transduction
  amplification of signal
  protein kinases
  cAMP
  Ca^{++}
Response
  anything
  cytosolic, nuclear

Chapter 12 -- Mitosis

Chromosomes
Cell cycle
Mitotic phases
  prophase
  metaphase
  anaphase
  telophase
Cytokinesis
Control
  restriction point
  cancer (out of control)
  protein kinases
Chapter 13 -- Meiosis

Reproduction
  asexual
  sexual
Alternation of generations
Meiosis I
  prophase I - recombination
  metaphase I
  anaphase I
  telophase I
Meiosis II -- same as mitosis, except not preceded by DNA synthesis
Genetic consequences
  independent assortment of chromosomes
  crossing over
  combinatorics of fertilization
Variation as raw material for natural selection (evolution)

Chapter 14 -- Mendelian Genetics

Genes
Mendel’s peas
Alleles
Law of Segregation
  discrete nature of gene
  dominance
  segregation
    Punnett square
  phenotype/genotype
  test cross
  probability
Law of Independent Assortment
dihybrid cross
Incomplete and co-dominance
Multiple alleles
Pleiotropy
Epistasis
Polygenic inheritance (QTL)
Human genetics
  pedigree analysis
  degree of relatedness
  genetic counseling
    amniocentesis
Chapter 15 -- Chromosomal basis of inheritance

Sex linkage in flies
Genetic linkage
    recombination frequency
    linkage map
Deviations from genetic map
    hotspots, centromeres
Sex linkage in humans
X-inactivation
Altered chromosome number
    non-disjunction, aneuploidy
    polyploidy
Structural rearrangements
    deletion, duplication, inversion
    reciprocal translocation
Cytoplasmic inheritance

Chapter 16 -- DNA

Genetic material
    transformation
    Hershey-Chase phage expt
    Watson-Crick double helix
Base pairing
Semi-conservative nature of replication
Meselson-Stahl density experiment
Templated synthesis
Origin of replication
    replication fork
    enzymology
Repair
Chapter 17 -- Transcription and Translation

Information flow
Beadle and Tatum
“one gene - one polypeptide”
Transcription
promoter
transcription unit
RNA processing and modification
splicing
degradation
Translation
genetic code, codons
reading frame
ORFs, UTR
redundancy (wobble)
strandedness - nomenclature
ribosome -- P site, A site
tRNA
release factor
Mutation
substitutions -- silent, missense, nonsense
deletions, insertions - frameshift
mutagenesis, Ames test

Chapter 18 -- Bacteria and Viruses

Viral structure
Life cycle
lytic cycle
lysogenic cycle
Enveloped viruses
RNA viruses
HIV
Vaccines
Bacteria
gene transfer
transduction
plasmids
conjugation
transposons and insertion sequences
Gene regulation
operons
lac operator
induction by derepression
Chapter 19 -- Eukaryotes

DNA organization
  “junk” DNA
  multigene families
  enhancers
Genome plasticity
  amplification
  elimination
  cassette expression
  rearrangement
Regulation, hormones

Chapter 20 -- DNA technology

Restriction enzymes
Cloning -- vectors, ori
Ligation
  cDNA libraries
Transformation
Selection, complementation
Screening
  color screen
  hybridization
Southern hybridization, RFLP
  electrophoresis
PCR
Sequencing
Mutagenesis
Ti-plasmid

Bioethics

Agriculture -- genetically modified foods
Genetic screening, insurance, and privacy
Human gene therapy
Germ-line therapy
Patent issues
  patenting life?
  government grants for private profit?