BIOL. 121 (Section 221) – Spring 2009
ECOLOGY, GENETICS, & EVOLUTION
TUE. & THURS. 0930 — 1100 hrs, BioSc. Rm. 2000

INSTRUCTOR: Dr. Michael W. Hawkes
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TEXTBOOK: Freeman, S. 2008. (3rd Ed). *Biological Science*
IMPORTANT DATES: Mid-Term break 16-20 Feb.
LAST DAY OF CLASSES: 7 April for this course (8 April for others)
MID-TERM EXAMS: Mid-Term #1: **3 February.** Mid-Term #2: **5 March**
MARK DISTRIBUTION: Mid-Term #1: 20%, Mid-Term #2: 20%, Final Exam: 60%

LECTURE OUTLINE & TEXT REFERENCES

TOPICS	**TEXT CHAPTERS / Pages**
INTRODUCTION	
1. Course overview: the instructor, the text,	
• Course expectations and your mission	Chap. 1
• Biology and the Tree of Life: Domains Bacteria, Eukarya & Archaea	
2. Theme: Biodiversity: Origins, maintenance, & reproduction	
3. Peering into the Abyss of Deep Time: The geological record	484, 548-556, 560-564
POPULATION & COMMUNITY ECOLOGY	
1. General introduction	11-15, Chap. 50
• Descriptive and experimental approaches	
2. Population structure & dynamics	Chap. 52
• Population parameters - density & size	
• Demography: patterns of birth, growth, reproduction, & death	
• Life history strategies	
3. Interactions within biological communities	Chap. 53
• Community structure	
• Influence of disturbance on community structure	
• Competition & predation	
• Biological control	
• Influence of competition & predation on community structure – The 'Kelp, Sea Urchins, & Sea Otter' Story	
• Ecological biogeography	1143-1146
• Theories on the generation and maintenance of species diversity	
REPRODUCTIVE BIOLOGY & GENETIC VARIABILITY	
1. DNA structure & replication review	Chaps. 4, 14
2. Concept of the gene: Molecular basis of inheritance	Chap. 15, 16
• Gene mutations	
3. Eukaryote reproduction: mitosis; meiosis & syngamy	Chap. 11, 12
• Life history diversity	612-615
4. Reproductive strategies: asexual vs sexual reproduction	
5. Special Topic: Epigenetics	*Nature* reading TBA

THE CHROMOSOMAL BASIS OF INHERITANCE: MENDELIAN GENETICS & BEYOND

1. Historical background & definition of terms

2. Mendelian analysis - Mendel's 1st & 2nd Laws — Chap. 13
- Mono- & dihybrid crosses, test cross

3. Genetics after Mendel: alleles & their interactions
- Incomplete dominance & codominance
- Epistasis
- Polygenic inheritance, multiple alleles - human blood groups
- Crossing-over, linkage groups, sex determination, Sex-linkage
- Gene mapping in eukaryotes

4. Chromosome mutations
- Aneuploidy
- Human genetics: syndromes associated with aneuploidy
- Polyploidy, with emphasis on plant evolution

THE EVOLUTION OF POPULATIONS

1. The gene pool, Hardy-Weinberg equilibrium — Chap. 25

2. Sources of variability & types of selection

3. Genetic drift, gene flow, non-random mating

EVOLUTION: PATTERN & PROCESS

1. Descent with modification: the evidence — Chap. 24

2. Species concepts & modes of speciation — Chap. 26

3. Systematics, phylogeny reconstruction, & classification — 8-10, Chap. 27, 600-601

4. Continental drift and historical biogeography — 532-533, 552-553
Video: *Land of the Kiwi* (15 min)
- **Slide show:** Australasian case studies

5. Bacterial ancestry of chloroplasts & mitochondria — 584-586, 603-611

6. Is the modern synthesis unfinished?
- **Slide show:** Galapagos: A desert archipelago

SPECIAL TOPIC: THE KILLER WHALES OF B.C. — **NOT IN TEXT!**
- Residents, transients, & offshore groups
- Social organization, feeding behavior, & communication

Video: Island of Whales (50 min)
Chap. 54 (in part)

CONSERVATION BIOLOGY & ENVIRONMENTAL ISSUES — Chap. 55 (in part)

1. Sustainability Issues: Georgia Basin & Puget Sound — **Video:** *Time to Choose Our Common Future in the Fraser River Basin* (30 min)
- Our ecological footprint

"This might be the most insidious result of the loss of respect for "old fashioned" natural history: very few students are offered the opportunity of observing nature and accumulating the background natural history essential to the ecological understanding necessary to ask relevant questions."

-Paul Dayton 2003