**Introduction and The scientific method:**

Anthropomorphism
Anecdote
The scientific method
Observational vs. explanatory science
Null hypothesis
Cannot prove hypotheses, only reject or support them
Scientific theory
Ethogram
Graphs, dependent/independent axis, categorical/continuous variable
Correlation does not equal causation

**Natural Selection and Evolution:**

Natural selection
Requirements for Natural Selection
Evolution
Variation in population
Frequency-dependent selection
Directional selection
Stabilizing selection
Origin of new traits
Darwin
Wallace
Lamarck
Artificial selection
Genetics: Gene, allele, gene pool, evolution, heritable, fitness, adaptation, natural selection
How to study heritability: parent-offspring regression, selection experiments
Adaptationist approach
Constraints on adaptive perfection: failure of appropriate mutations to occur, pleiotropy, Co-evolution
Why is infanticide adaptive?
Cost-benefit approach, most adaptive phenotype
Direct and indirect fitness measures
Mobbing
Comparative method
Convergent and divergent evolution
Kin selection
Sexual selection

**Levels of Analysis:**
Levels of analysis
Holekamp and Sherman paper

**History of Animal Behavior:**

Romanes
Morgan’s Canon
Comparative psychology and behaviorism
Watson
General laws of learning
Skinner
Thorndike
Operant conditioning
Classical conditioning
Pavlov
Classical ethology
Von Frisch
Lorenz
Tinbergen
Fixed action pattern
Nature vs. Nuture
Behavioral Ecology

**Methods:**

Lab studies
Field studies – naturally occurring variation, age, sex, social status, reproductive status, season
Individual identification
Field experimental techniques
Umwelt
Jeanne Altmann
States and events
Ad libitum
Zero-one sampling
Scan sampling
Critical-incident sampling
Focal-animal sampling
Sources of error – apprehending, observer effect, error of recording, computational error, observer error, observer bias

**Behavioral Genetics:**
Knockout studies
Behavioral variation associated with genetic variation
Phenotype
Genotype
Gene-environment interactions
Mendelian traits
Polygenic traits
QTL mapping
Microarray analysis
Birdsong genetics
Heritability – equations
Total genotypic variation = additive, dominance, epistasis
Total phenotypic variation = genotypic, environment, interaction
Genetic environment interaction
Rover and sitter fruit flies

**Behavioral Development:**

Behavioral development
Ontogenetic trajectory
Precocial
Altricial
Learning even before birth
Waddington’s Epigenetic Landscape
Canalization
Differentiation
Social development
Social environment can effect behavioral development
Harlow experiments
Filial imprinting
Sexual imprinting

**Hormones and Behavior:**

Behavioral endocrinology
Neural vs. hormonal mediation of behavior
History – chick testosterone, Arnold Berthold
Hormone definition
Hypothalamus
Pituitary
Adrenal cortex – Adrenal medulla
Pineal
Ovaries
Testes
Vasopressin
Oxytocin
Prolactin
FSH
LH
Milk let down reflex
Melatonin
Adrenaline
Cortisol
Testosterone
Estrogen
Behavior – hormone
Hormone – behavior
Secondary sexual characteristics
Negative effects of testosterone – including survival
Ablation and replacement experiments
Associated reproductive pattern
Disassociated reproductive pattern
Organization effects
Activational effects
Organizational = Ontogeny
Activational = Mechanism
Hormones during development in mice, 0M and 2M females
1) Hormones are chemical messengers that are synthesized in endocrine glands, secreted into the bloodstream and act on distant target cells or tissues.
2) Hormones can affect behaviour by influencing the central nervous system in adulthood or during early development.
3) Hormone production is regulated by feedback loops, internal stimuli and external stimuli, including social interactions.