TheCornellLab of Ornithology

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Ornithology: Comprehensive Bird Biology

"Birds are awesome." --Kevin J. McGowan

https://academy.allaboutbirds.org/courses/ornithology-comprehensive-bird-biology/

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Grading: Badge and certificate awarded for earning an average of 65% across all of the quizzes in the course.

I. Rationale:

This course was created to provide detailed information about the biology of birds to audiences around the world, allowing the study of birds from anywhere at any time. The course delves into many topics in great depth, ranging from evolution and anatomy to behavior and conservation. It does not address how to identify birds, which is covered by other courses in Bird Academy.

II. Course Aims and Outcomes:

Aims

Students will be exposed to the diversity of bird life on Earth and to the myriad ways birds are adapted to fly and survive in all reaches of the planet.

Specific Learning Outcomes:

By the end of this course, students will:

- appreciate the diversity of birds of the world and understand how birds are classified;
- learn how birds evolved and are still evolving;
- recognize some of the ways that birds are physically adapted to fly, communicate, find food, and attract mates;
- understand the role of birds in the world and how they interact with humans.

III. Format and Procedures:

This self-paced online course guides the student through each chapter from the textbook. Lessons contain a short video from the course authors introducing key insights, and curated collections of online resources to expand the student's knowledge base. Exams are divided into individual quizzes that take 15 to 20 minutes to complete; they provide immediate feedback to correct misconceptions and reinforce important facts. Students also have the opportunity to have questions answered by course instructors.

IV. Course Requirements:

1. Course readings:

The student may view the materials at any time; access continues after completion of the course.

(a) Required text: *The Handbook of Bird Biology, 3rd edition*.

(b) Each lesson includes a Course Materials section with online resources that reinforce the lesson topic. The student is expected to view these materials. Some exam questions are based on information presented only in this section.

(c) Each lesson includes a More to Learn section that includes links to additional resources about the lesson topic. These materials are not required for completion of the course and are not included in the exam questions.

2. Quizzes:

Lessons 2 through 15 are followed by a set of 4 quizzes that take 15 to 20 minutes to complete and which provide immediate feedback. Each lesson has one quiz of multiple-choice questions that have a single correct answer, one quiz of multiple-choice questions that might have multiple correct answers, one quiz of true-or-false questions, and one quiz containing matching, sorting, or fill-in-the-blank questions.

3. The student is expected to read all of the textbook, complete all of the quizzes, and review all of the online materials.

V. Grading Procedures:

1. Each quiz may be attempted up to five times. The highest score is kept and used to calculate the overall course average, which must match or exceed 65% correct.

2. Students must attempt all of the quizzes.

3. Students must review all the online materials to complete the course and earn the ornithology badge. Students achieving the ornithology badge have the option of receiving a printed certificate signed by the Cornell Lab of Ornithology director.

VI. Accommodations for students with disabilities:

Our website meets Level AA conformance to the Web Content Accessibility Guidelines (WCAG) 2.0. https://www.w3.org/TR/WCAG20/. All video presentations in the course are close-captioned, and alt-text descriptions accompany all images.

VII. Course Schedule

Topics	Readings	Course materials	Assignment
Chapter 1 Why study birds?	*Handbook* Chapter #1	Short videos about scientists	
Chapter 2 Avian Diversity and Classification • Classifying avian diversity • Phylogenetics • Origin of birds	*Handbook* Chapter #2	Bird diversity interactive with Lab's Wall of Birds mural	Four quizzes
Chapter 3 How birds evolve • Natural selection • Sexual selection • Speciation • Hybridization • Divergence • Adaptive radiations	*Handbook* Chapter #3	Animations about sexual selection and speciation	Four quizzes
Chapter 4 Feathers and Plumages • Structural basics • Feather development • Evolution of feathers • Types of feathers • Molts and plumages • Feather care • Coloration • Texture • Visual functions of plumage	*Handbook* Chapter #4	Animations of feather Structure of feathers; diagrams of how feathers produce color	Four quizzes
Chapter 5 Avian Flight • Aerodynamics • Power for flight • Maneuvering and stability	*Handbook* Chapter #5	Illustrations of major wing shapes; short video of how birds land; discussion of V-formation flying	Four quizzes
Chapter 6 Avian Anatomy • Skeletal system • Muscular system • Respiratory system • Digestive system • Urogenital System • Circulatory system • Nervous system • Sensory system	*Handbook* Chapter #6	Bird anatomy interactive with self-quiz mode; animated diagrams of flight muscles and respiratory system	Four quizzes

Chapter 7 Bird Physiology • Maintaining an internal balance • Not too hot or cold • Nutrition • Dealing with pathogens • Exercise physiology of flight • Avian endocrine system • Bird brains • Sensory physiology	*Handbook* Chapter #7	Short video about toucan body temperature	Four quizzes
Chapter 8 Avian Food and Foraging • Energy and nutrition • Optimal foraging • Diversity of foods and foraging behaviors • Social foraging • Feeding specialization and generalization	*Handbook* Chapter #8	Short videos of birds foraging	Four quizzes
Chapter 9 Avian Mating and Social Behavior • Female mating preferences • Pair-bonds, courtship, and divorce • Male mating preferences • Adaptive value of mate choice • Sexual selection and mating systems • Costs and benefits of social behavior	*Handbook* Chapter #9	Short videos of different mating systems	Four quizzes
Chapter 10 Avian Vocal Behavior • Studying bird sounds • Vocal repertoires • Vocal development • Production and control of song • Song variation in space and time • Functions of bird song • Signal value of differences among singers • Other features of singing behavior	*Handbook* Chapter #10	Spectrograms and visualizations of bird sounds; animated diagrams of syrinx structure and action	Four quizzes

Chapter 11 Breeding Biology of Birds • Timing of breeding • Breeding territories • Nests and nest building • Nest-building behaviors • Eggs • Clutch size • Clutch and egg replacement • Incubation • Hatching • Altricial and precocial young • Parent/offspring recognition • Caring for young • Survival and reproductive tradeoffs • Adult and offspring survival	*Handbook* Chapter #11	Animation of songbird embryo development; videos of birds at various types of nests	Four quizzes
Chapter 12 Avian Migration and Dispersal • Types of movements • Patterns in migration • How birds time their migrations • Orientation and navigation • Migration physiology • Dispersal • Evolution of avian movement patterns	*Handbook* Chapter #12	Short video about studying migration across hemispheres	Four quizzes
Chapter 13 Ecology of Bird Populations • Avian population ecology • Changes in populations over time and space • Censusing bird populations • Avian demography • Life history evolution • Ecological niches • Limiting factors for bird populations • Population regulation • Populations through time and space	*Handbook* Chapter #13	Short videos about studying bird populations	Four quizzes

Chapter 14 Bird Communities • Classifying bird species assemblages • Ways of describing communities • Patterns of species diversity • The niche: a fundamental unit in community ecology • Interspecific competition • Evidence for interspecific competition • Interspecific commensalism • Mutualisms • Parasitism • Predation • Food chains and food webs • Communities within birds • Top-down effects, trophic cascades, and ecological services	*Handbook* Chapter #14	Short videos about studying birds and their communities	Four quizzes
Chapter 15 Bird Conservation • History of bird conservation • Conservation biology • Recent avian extinctions • Causes of avian population declines • Major threats to bird populations • Avian population increases • Conservation solutions • Value of wild birds • What each of us can do	*Handbook* Chapter #1	Video lecture on how birds can save the world	Four quizzes