sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasi- sis different each quarter. One Saturday field trip. GE credit: Sci|Eng|SE.

16LC. Raptor Migration and Population Fluctuations (2)
Fieldwork—3 hours; discussion—1 hour. Prerequi- site: 115. Identification raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiar- ize with literature, design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, empha- sis different each quarter. One Saturday field trip. GE credit: Sci|Eng|SE.

92. Internship in the Avian Sciences (1-12)
Internship—3 hours. Prerequisite: Sophomore standing preferred; consent of instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency involved with these entities. Compliance with Internship Approval form essential. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division

100. Avian Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, Animal Science 2 preferred. Biology of domesticated poultry; specifically chickens and turkeys. Avian genetics, immunology, reproduction, growth and development, broiler and layer manage- ment. GE credit: SciEng|SE.—S. (S.) Zhou

103. Avian Development and Genomics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, Animal Science 2. Classification of avian development and genomics: Incubation; Staging; Egg Structure/Func- tion; Fertilization; Pre-oviposition; Oviposition, Cold Tolerance; Pre-ovipositional Development; Organogene- sis, Growth, Sexual Differentiation; Extraembryonic Membranes; Mortality/Hatching; Genome Organiza- tion; Comparative Avian Genomics; Telomere Biology; Sex Chromosomes; Sex Determination; Advanced Technologies; Genome Manipulation; Mutations. GE credit: SciEng|SE.—F. (F.) Delany

115. Raptor Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 2A or the equivalent. Study of birds of prey: classifi- cation, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal consid- erations, rehabilitation, and falconry. Includes two Saturday field trips. Offered irregularly. GE credit: SciEng|SE.—Su. (S.)

121. Avian Reproduction (2)
Lecture—2 hours. Prerequisite: Biological Sciences 2A, 2B. Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual develop- ment, imprinting, hormonal control of reproduc- tive behavior and song. Species coverage includes wild and captive birds. Course has a physiological orientation. GE credit: SciEng|SE, SL.

123. Management of Birds (3)
Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B. Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smugg- ling. Emphasis on exotic species and the role of captive propagation in conservation. GE credit: SciEng|SE, SL, WE.

149. Egg Production Management (2)
Lecture—2 hours. Prerequisite: course 111 or consent of instructor. Managerial of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg pro- cessing and raising replacement pullets. One Satur- day field trip required. GE credit: SciEng|SE.

150. Nutrition of Birds (1)
Lecture—1 hour. Prerequisite: Animal Biology 103 or Biological Sciences 103 (may be taken concur- rently). Principles of nutrition specific to avian spe- cies, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. GE credit: QL, SciEng|SE.

160. Designing and Performing Experiments in Avian Sciences (2)
Laboratory—6 hours. Prerequisite: course 100 or Wildlife, Fish, and Conservation Biology 111 or consent of instructor. Experimental design in current prob- lems in avian biology. Introduction to experimental design. Students choose a project, design a proto- col, perform an experiment and report their findings. May be repeated up to three times for credit. GE credit: SciEng|SE.—F, W, S. (F, W, S.)

170. Advanced Avian Biology (4)
Lecture/discussion—3 hours; project—1 hour. Prereq- uest: course 100 or Wildlife, Fish, and Conser- vation Biology 111. Ecology, behavior, functional morphology and life-history evolution of birds. Emphasis on the importance of body size as a princi- ple determinant of most aspects of avian perfor- mance from lifespan to reproduction and species abundance. Analytical synthesis and critical thought emphasized. GE credit: SciEng|SE.

190. Seminar in Avian Sciences (1)
Seminar—1 hour. Prerequisite: consent of instructor. May be repeated three times for credit. (P/NP grading only.)—S. (S.) Klassing

192. Internship in Avian Sciences (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in business, industry, or agency involved with these entities. Compliance with Internship Approval form essential. (P/NP grading only.)

195. Topics in Current Research (1-3)
Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.—F. (F.) Delany

197T. Tutoring in Avian Sciences (1-3)
Tutorial—1-3 hours. Prerequisite: consent of instruc- tor. Tutoring of students in lower division avian sci- ences courses; weekly conference with instructors in charge of courses, written critiques of teaching pro- cedures. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate

203. Advanced Avian Development and Genomics (1)
Discussion—1 hour. Prerequisite: graduate standing; concurrent enrollment in course 103. In consultation with the instructor, student develops a lecture and associated instructional materials, i.e., lesson plan, including justification, reading and presentation and evaluation aids. The topic must complement a topic covered in Avian Sciences 103. Offered irregu- larly.—F. (F.) Delany

290. Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.—F. (F.) Klassing

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project propos- als presented and evaluated. Format will combine seminar discussion and discussion. (S/U grading only.)—F, W, S. (F, W, S.)

297T. Supervised Teaching in Avian Sciences (1-4)
Tutoring—1-4 hours. Prerequisite: graduate standing and consent of instructor. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching meth- ods in lectures and laboratories. (S/U grading only.)—F, W, S. (F, W, S.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

Avian Sciences
(A Graduate Group)

Kirk Klasing, Ph.D., Chairperson of the Group
Group Office. 1249 Meyer Hall

Faculty
Richard Blatichford, Ph.D., Assistant Poultry Extension Specialist (Animal Science)
C. Christopher Calvert, Ph.D., Professor (Animal Science)
Thomas P. Coombs-Hahn, Ph.D., Associate Professor (Neurobiology, Physiology, and Behavior)
Mary E. Delany, Ph.D., Professor (Animal Science)
John M. Eadie, Ph.D., Professor (Wildlife, Fish, and Conservation Biology, Animal Science)
Michelle Hawkins, V.M.D., ABVP, Associate Professor (Medicine and Epidemiology, School of Veterinary Medicine)
Joshua M. Hull, Ph.D., Assistant Adjunct Professor (Animal Science)
Annie J. King, Ph.D., Professor (Animal Science)
Kirk C. Klasing, Ph.D., Professor (Animal Science)
Maja M. Makagon, Ph.D., Associate Professor (Animal Science)
Jay A. MENCH, Ph.D., Professor (Animal Science)
James R. Willam, Ph.D., Professor (Animal Science)
Gabrielle Nevitt, Ph.D., Professor (Neurobiology, Physiology, and Behavior)
Joanne R. Paul-Murphy, D.V.M., Ph.D., Professor (Medicine & Epidemiology, School of Veterinary Medicine)
Maurice E. Pitesky, D.V.M, M.P.V.M., Dipl ACVPM, Assistant Specialist in Cooperative Extension (Population Health & Reproduction; School of Veterinary Medicine)
Lisa A. Tell, D.V.M., Professor (Medicine and Epidemiology, School of Veterinary Medicine)
Huiyan Zhou, Ph.D., Associate Professor (Animal Science)

Emeriti Faculty
Hans Ablaplanolp, Ph.D., Professor Emeritus
Dan Anderson, Ph.D., Professor Emeritus
Francine A. Bradley, Ph.D., Specialist Emeritus
Ralph A. Ernst, Ph.D., Specialist Emeritus
Peter Marler, Ph.D., Professor Emeritus
Barry W. Wilson, Ph.D., Professor Emeritus

Affiliated Faculty
Lowell Ashbaugh, Ph.D., Associate Researcher Emeritus (Cancer Nuclear Laboratory)
Steven S. Cliff, Ph.D., Assistant Researcher Emeritus
Ann Dillner, Ph.D., Assistant Researcher (Cancer Nuclear Laboratory)
Richard L. Snyder, Ph.D., Biometeorology Specialist
Biochemistry and Molecular Biology

See Biochemistry, Molecular, Cellular and Developmental Biology, on page 189; Molecular and Cellular Biology, on page 463

Biochemistry and Molecular Biology (A Graduate Group)

The Biochemistry and Molecular Biology program has merged with the Cell and Developmental Biology program to form Biochemistry, Molecular, Cellular, and Developmental Biology (BMCD'B). See Biochemistry, Molecular, Cellular and Developmental Biology, on page 189.

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Biological Chemistry

See Medicine, School of, on page 427.

Biochemistry, Molecular, Cellular and Developmental Biology

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Faculty

Iannis, Adamopoulos, Ph.D., Associate Professor (Medical Division of Internal Medicine, Rheumatology)
Jawdat Al-Bassam, Ph.D., Assistant Professor (Molecular and Cellular Biology)
John, Albeck, Ph.D., Assistant Professor (Molecular and Cellular Biology)
F. Javier Arsuaga, Ph.D., Professor (Mathematics, Molecular and Cellular Biology)

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