**80. Seminar (1) Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current development in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only)—F, W, S. (F, W, S.)**

**291A. Research Conference in Atmospheric Science: Air Quality Meteorology (1-3) Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Air Quality Meteorology. May be repeated up to 6 units for credit. (S/U grading only)—F, W, S. (F, W, S.)**

**291B. Research Conference in Atmospheric Science: Biometeorology (1-3) Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Biometeorology. May be repeated up to 6 units for credit. (S/U grading only)—F, W, S. (F, W, S.)**

**291C. Research Conference in Atmospheric Science: Boundary Layer Meteorology (1-3) Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Boundary Layer Meteorology. May be repeated up to 6 units for credit. (S/U grading only)—F, W, S. (F, W, S.)**

**291D. Research Conference in Atmospheric Science: Climate Change (1-3) Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Climate Change. May be repeated up to 6 units for credit. (S/U grading only)—F, W, S. (F, W, S.)**

**291E. Research Conference in Atmospheric Science: General Meteorology (1-3) Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in General Meteorology. May be repeated up to 6 units for credit. (S/U grading only)—F, W, S. (F, W, S.)**

**291F. Research Conference in Atmospheric Science: Aerosol Engineering (1-3) Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Aerosol Engineering. May be repeated up to 6 units for credit. (S/U grading only)—F, W, S. (F, W, S.)**

**299. Research (1-12) Research—1-12 units. Only for graduate students. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)**

Atmospheric Science (A Graduate Group)

Christopher Cappa, Ph.D., Assistant Professor
(Civil and Environmental Engineering)
Shu-Hua Chen, Ph.D., Assistant Professor
Ian Falona, Ph.D., Associate Professor
Richard Grotjahn, Ph.D., Professor
Michael J. Kleeman, Ph.D., Professor
Richard L. Snyder, Ph.D., Biometeorology Specialist
Ann Dillner, Ph.D., Assistant Researcher
Anthony Wexler, Ph.D, Professor (Mechanical and Aerospace Engineering; Civil and Environmental Engineering)
John Largier, Ph.D., Professor
(Earth and Planetary Science)
Terrence K. Nathan, Ph.D., Professor
Kyaw Thaw Pa U, Ph.D., Professor
Paul Ullrich, Ph.D., Assistant Professor
Susan Ustin, Ph.D., Professor
(Land, Air and Water Resources)
Anthony Wexler, Ph.D, Professor (Mechanical and Aerospace Engineering)
Zhang, Qi, Assistant Professor (Environmental Toxicology)
Emeriti Faculty
Thomas A. Cahill, Ph.D., Professor Emeritus
Robert Flochini, Ph.D., Professor Emeritus
(Crocker Nuclear Laboratory)
Ruth Reck, Ph.D, Professor Emeritus
Bryan Wepfer, Ph.D., Professor Emeritus
Affiliated Faculty
Lowell Ashbaugh, Ph.D., Associate Researcher Emeritus (Crocker Nuclear Laboratory)
Steven S. Cliff, Ph.D., Assistant Researcher (Applied Science)
Ann Dillner, Ph.D., Assistant Researcher (Crocker Nuclear Laboratory)
Richard L. Snyder, Ph.D., Biometeorology Specialist
Richard Anthony VanCuren, Ph.D., Professional Researcher (Air Pollution Research Center)
Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. A student may place emphasis on graduate work in one or more of the following fields: air quality meteorology, atmospheric chemistry, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large scale dynamics, and meso-scale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses will be completed within the first year of graduate study.

Graduate Adviser. Terrence Nathan, Ph.D.
Graduate Admissions Officer. Christopher Cappa, Ph.D.

Avian Sciences

This major has been discontinued as of Fall 2011; see Animal Science, on page 162.

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Animal Science, on page 162.

**Advising Center.** For the minor and course offerings is located in the Animal Science Advising Center in 1202 Meyer Hall 530-754-7915; http://asac.ucdavis.edu/.

**The Program.** The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field give students a large role in selecting and designing their own course work.

Internships and Career Alternatives. Independent study, undergraduate research, and internships are emphasized in the Avian Sciences program. Birds for laboratory or special study are housed within the main building as well as at the research farm and the experimental aviary.

Minor Program Requirements:

Avian Sciences ................................. 18

Choose one from: Avian Sciences 11, 13, 14L, 15L, 16L, 34L, 35L

Choose remaining units from: Avian Sciences 100, 103, 115, 121, 123, 149, 150, 160; Animal Science 143; Neurobiology, Physiology, and Behavior 117; Wildlife, Fish, and Conservation Biology 111.

Graduate Study. The Avian Sciences Graduate Group offers a program of study and research leading to the M.S. degree in Avian Sciences. The M.S. degree is offered in Avian Sciences. For details, see Graduate Studies, on page 120.

Related Courses. See Agricultural and Resource Economics 130; Animal Science 143; Food Science and Technology 120, 120L, 121; Molecular and Cellular Biology 150, 1500; Nutrition 123, 123L.

Courses in Avian Sciences (AVS)

Lower Division

11. Introduction to Poultry Science (3) Lecture—3 hours. The mosaic of events that have led poultry science to its current state and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. GE credit: SciEng/Wrt|SE, Wrt|SE.

13. Birds, Humans and the Environment (3) Lecture—2 hours; discussion—1 hour. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, population fluctuations, flight, behavior, folklore, identification, ecology and conservation. Current environmental issues are emphasized. Half-day field trip. GE credit: SciEng/Wrt|SE, SL. (F) King

14L. Management of Captive Birds (2) Fieldwork—3 hours; lecture/discussion—1 hour. Prerequisite: consent of instructor. One weekly discussion and field trip to study practical captive management (housing, feeding, equipment, marketing, diseases). Visit facilities rearing birds such as commercial parakeets, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons. GE credit: SciEng/Wrt|SE.

15L. Captive Raptor Management (2) Laboratory—3 hours; independent study—3 hours; one field trip. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for captive animals, including their husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements. GE credit: SciEng/Wrt|SE.

16L. Raptor Migration and Population Fluctuations (2) Fieldwork—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species identification, empha-
sis different each quarter. One Saturday field trip. GE credit: SciEng/Wrt|SE.

16LB. Raptor Migration and Population Fluctuations (2) Fieldwork—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Emphasis different each quarter. GE credit: SciEng/Wrt|SE.
sites; collect, computerize, analyze data, compare with previous years. Species, observations, empha-
sis different each semester. One Saturday field trip. GE credit: SciEng | SE.

16LC. Raptor Migration and Population Fluctuations (2)
Fieldwork—3 hours; discussion—1 hour. Prerequi-
site: 102 or 103. Prerequisite: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiariz-
ate with literature, design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, empha-
sis different each semester. One Saturday field trip. GE credit: SciEng | 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 concerned 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. Management of commercial table egg production. GE credit: SciEng | SE.

Avian Sciences (A Graduate Group)

Kirk Klaing, Ph.D., Chairperson of the Group
Group Office, 1249 Meyer Hall
530-752-2382, http://avianscience.ucdavis.edu

Faculty
Richard Blatchford, Ph.D., Assistant Poultry Extension Specialist (Animal Science)
C. Christopher Calverly, 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, Animal Sciences)
Joshua M. HAH, Ph.D., Assistant Adjunct Professor (Animal Science)
Annie J. King, Ph.D., Professor (Animal Science)
Kirk C. Klaing, Ph.D., Professor (Animal Science)
Maja M. Makagon, Ph.D., Assistant Professor (Animal Science)
Jay A. Mensch, Ph.D., Professor (Animal Science)
James R. Millam, 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. Pletske, D.V.M., M.P.V.M., Dipl ACVPM, (Animal Science)
Lisa A. Tell, D.V.M., Professor (Medicine and Epidemiology, School of Veterinary Medicine)
Hajiaf Zhou, Ph.D., Associate Professor (Animal Science)

Emeriti Faculty
Hans Alpmanalp, 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
Lothar Asbach, Ph.D., Associate Researcher Emeritus (Crocker Nuclear Laboratory)
Steven S. Clif, Ph.D., Assistant Researcher Emeritus (Applied Sciences)
Ann Dillner, Ph.D., Assistant Researcher Emeritus (Crocker Nuclear Laboratory)
Richard L. Snyder, Ph.D., Biometeoreology Specialist

Fall 2011 and on Revised General Education (GE): AAH—Arts and Humanities; SE—Science and Engineering; SS—Social Sciences; AQ—Quantitative; BD—Domestic Diversity; CL—Cultural Literacy; DL—Critical Literacy; EO—Oral Skills; GQ—Global, Quantitative; SL—Scientific; VL—Visual; WC—World Cultures; WE—Writing Experience
Pre-Fall 2011 General Education (GE): AH—Arts and Humanities; SciEng—Science and Engineering; SocSci—Social Sciences; Div—Domestic Diversity; Wrt—Writing Experience
Quarter Offered: F—Fall; W—Winter; S—Spring; Su—Summer; 2017-2018 offering in parentheses

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 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)