Darwin and the Galápagos
ECOL 5620/ZOO 4900/5750; 4 credits
Drs. Craig Benkman and Carlos Martinez del Rio
Fall 2015/Winter 2016

Course Description: The Galápagos are truly unique because of (1) their historical and contemporary importance to the development of evolutionary biology, starting with Darwin's visit in 1835 and continuing especially with the classical studies by Drs. Peter and Rosemary Grant and their colleagues on the ecology and evolution of Darwin's finches, (2) the extensive primary and secondary literature that we can draw from including numerous books (e.g., *Darwin in Galápagos* that follows Darwin's footsteps in the Galápagos and the Pulitzer-Prize winning *The Beak of the Finch* that chronicles the studies of the Grants and their students), and (3) there is no better place to see such a wide diversity of iconic species up-close in both remarkably pristine (97% of the Galápagos is protected in a National Park) and highly impacted habitats. To take advantage of the extraordinary opportunities provided by the rich literature, research, and biodiversity, this 4-credit course will combine a seminar during fall 2015 (90-minute meetings each week) with a 2016 winter session expedition to Ecuador and the Galápagos Islands National Park (12-24 January). A key component of the trip is that Greg Estes will lead us while on the islands. Greg is the co-author of *Darwin in Galápagos: Footsteps to a New World*, published in 2009 by Princeton University Press; we will use this book while in the Galápagos. Greg has 30 years experience as a researcher and guide on the Galápagos and has consulted on numerous projects about Darwin and the Galápagos including the BBC/National Geographic Society documentary *Galápagos: The islands that changed the world*.

Course Goals: The goals of this course are to experience and learn about the natural history of the iconic Galápagos Islands, understand the role of the Galápagos Islands in the development of the theory of evolution by natural selection, learn about contemporary research on the Galápagos including especially the rapidity of evolution by natural selection, learn about current conservation issues on the Galápagos and their similarities to issues in Wyoming, and learn the Grinnell method of taking field notes.

Target Audience: The target audience for the course is undergraduate and graduate students in the biological sciences. This course will provide a field-oriented complement to the undergraduate and graduate evolutionary biology courses on campus (LIFE 3500 and BOT/ECOL/ZOO 5060), and to biodiversity courses in general, as there is no better place than the Galápagos to be immersed in evolutionary biology.

Seminar Meeting Schedule (7 – 8:30 pm, Thursday in 227 Berry Center, plus relevant Dept. of Zoology & Physiology seminars at 12:00 – 1:00 pm on Fridays in 138 Berry Center)

Date	Topic	Readings*
Sept 3	Course introduction; expedition itinerary	
Watch videos:	http://www.hhmi.org/biointeractive/origin-species-beak-finch http://www.youtube.com/watch?v=iA0NF41tLn8	
Sept 10	Evolution by natural selection in the Galápagos	Weiner, Ch 1-7
Sept 17	How & why species multiply	Weiner, Ch 8-14
Sept 24	The evolution of the Galápagos & beyond	Weiner, Ch 15-20
Oct 1	Geology of the Galápagos	De Roy, Ch 1
Oct 8	Galápagos plants & their conservation	De Roy, Ch 5-7, 23
Oct 15	Fish identification and natural history	De Roy, Ch 9
Oct 22	Natural history and behavior of Darwin's finches	De Roy, Ch 14
Oct 23	Noon lecture by Dr. Jeff Podos	TBD
Oct 29	Galápagos hawks & snails	De Roy, Ch 8 & 15
Nov 5	The ecology, evolution, & conservation of the Galápagos tortoise	De Roy, Ch 11, 24
Nov 12	Marine & land iguanas	De Roy, Ch 12 & 13
Nov 19	The ecology & evolution of seabirds in the Galápagos	De Roy, Ch 16-19
Dec 3	Tourism & conservation in the Galápagos	De Roy, Ch 22, 25-28; Nicholls 2013
Dec 10	Final preparations for trip to Ecuador & Galápagos	

Required Texts & Readings: Jonathan Weiner, 1994. *The Beak of the Finch*; Tui De Roy (ed.), 2009. *Galápagos: Preserving Darwin's Legacy*; * additional readings from the primary literature will be assigned for most class meetings. **ORDER** These two the texts ASAP to make sure you have copies when the semester starts.

Expedition Calendar:

Jan 12 Fly to Quito. Quito Hotel (transfers)
Jan 13 Transfer to Bellavista Cloud Forest reserve. Overnight BCFR
Jan 14 Full day Bellavista Cloud Forest Reserve. Overngiht BCFR
Jan 15 Morning at Bellavista Cloud Forest Reserve. Transfer to Quito. Overnight Quito
Jan 16 Fly Quito to Baltra, Galapagos Islands. Santa Cruz (Highlands, CDRS). Board Reina Silvia
Jan 17 Floreana (Punta Cormorant, Champion, Post Office Bay, Asilo de Paz, Black Beach)
Jan 18 Isabela (Punta Moreno, Elizabeth Bay)
Jan 19 Isabela (Urvina Bay), Fernandina (Punta Espinosa)
Jan 20 Isabela (Tagus Cove, Punta Vicente Roca)
Jan 21 Santiago (Puerto Egas, Espumilla, Buccaneer Cove)
Jan 22 North Seymour, Santa Cruz (Black Turtle Cove, Las Bachas)
Jan 23 Baltra, fly to Quito. Overnight hotel
Jan 24 Fly home.

Required Texts for Expedition: Julian Fitter et al., 2000. *Wildlife of the Galápagos*; Thalia Grant and Gregory Estes, 2009. *Darwin in Galápagos: Footsteps to a New World.* You should read the latter text during the semester before the expedition with our itinerary in mind.

Grading:

1. Weekly one-page (typed, 12 pt, single spaced) summary of readings plus two questions, and participation in discussions during spring semester (150 pts)
2. Field notebook on the expedition that must be handed in following return. The format should follow a combination of "Journal" and "Species Account" as in Remsen (1977) and will be discussed further during semester (50 pts).
3. Participation in discussions during expedition: Points based on asking and answering questions, and applying knowledge gained in seminar and from readings (50 pts)

   Total: 250 pts.

Grade Scale: A: 100-90%; B: 89-80; C: 79-70; D: 69-60%; F: <60%
Other details:

No special immunizations are required for Galapagos and Bellavista. For all destinations in Ecuador, including Galapagos, you should be up-to-date with your regular shots, such as measles/mumps/rubella (MMR) vaccine, diphtheria/pertussis/tetanus (DPT) vaccine, poliovirus vaccine, etc. Hepatitis A and B vaccines are also recommended. We suggest consulting with your doctor and the Centre for Disease Control website.

Recommended websites for Galápagos and Darwin information:

Charles Darwin Foundation- http://www.darwinfoundation.org/english/pages/index.php

Complete Works of Charles Darwin Online- http://darwin-online.org.uk/

Darwin Correspondence Project- http://www.darwinproject.ac.uk/

Parque Nacional Galápagos Ecuador- http://www.galapagospark.org/

Galápagos Natural History Tours- http://galapagosnaturalhistorytours.com/

Galapagos Tortoise Movement Ecology Programme- http://www.gianttortoise.org

Galápagos – Google Earth

http://googleblog.blogspot.co.uk/2013/09/explore-galapagos-biodiversity-with.html

Youtube video attempting to illustrate the links between beaks and seeds in the adaptive radiation of finches – focusing primarily on Santa Cruz ground finches.

http://www.youtube.com/watch?v=iA0NF41tLn8

Bellavista Cloud Forest Reserve - http://www.bellavistacloudforest.com