BI 425/525  NATURAL HISTORY OF ANTARCTICA
Fall, 2015  MW 16:00-17:50,  SRTC Rm. 219
Lab: MW 18:00-19:30  SRTC Rm. 219

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Texts:
1. McGonigal, D. Antarctica: Secrets of the Southern Continent (or McGonigal and Woodworth – Antarctica: the Blue Continent) - Bookstore
2. Thomas, D.N. Frozen Oceans: the Floating World of Pack Ice - Amazon
3. HISTORICAL PAPERBACK (one of these is required reading) - Amazon

Additional Expectation: Students are required to construct a field guide of all organisms covered in the class and lab (a list will be provided). A field guide would include, at a minimum; identification & taxonomy, distribution, annual reproductive cycle, diet, predation and causes of mortality.

Class Organization: Natural History of Antarctica is a lecture, lab and discussion course that covers a wide variety of topic areas. Students will be expected to summarize and present selected readings in lab (see Reading List) and to look up and discuss additional current journal articles (where indicated). There will also be a variety of assignments and species presentations expected in lab throughout the course. Students are, of course, encouraged to delve further into topics of special interest to them.

The grade in this class is based on: 1) quizzes, two midterms and a final presentation; 2) reading summaries & special assignments (map, field guide, lab assignments, historic book summary); and 3) attendance/participation in lab.

DATE  PROPOSED SCHEDULE
Week 1
Sept 28  Introduction to Antarctica
LAB: 1. Antarctic Overview
2. Lab Assignment: map landmark presentation. We would like you to become thoroughly acquainted with Antarctica by making a detailed map or series of maps that include geographical and
geological landmarks, names of territories (lands), historical sites, oceanographic features, etc. These will help to familiarize you with locations of things presented and discussed in class. Your map will be due by the final. Each of you will be assigned as area to investigate in detail and present to the class in Wed’s lab via a short 3-4 min power point presentation. These will be assigned during this first lab.

Sept 30  Origin/Geology
LAB: Presentation of Antarctic areas.

Week 2

Oct 5  Oceanography
LAB: 1. Videos
2. Discussion of READING SUMMARIES for Week 1

Oct 7  Climate and Historic Climate Change
LAB: 1. Videos
2. Discussion of READING SUMMARIES for Week 2

Week 3

Oct 12  Icy Ecosystems
LAB: Discussion of current journal articles (student choice)

Oct 14  The Microbiome
LAB: 1. Assignment on microbial diversity: half the class will present species accounts for selected Antarctic microbes (to be assigned in class).
2. Discussion of microbial diversity

Week 4

Oct 19  Overview to Land & Marine Invertebrates
LAB: 1. Quiz on microbial diversity
2. Assignment on invertebrates: half the class will present species accounts for selected Antarctic invertebrates (to be assigned in class).

Oct 21  Invertebrates continued; terrestrial and aquatic adaptations
LAB: 1. Videos
2. Discussion of READING SUMMARIES for Weeks 3 & 4

Week 5
Oct 26  MIDTERM EXAM #1 in class (will include a Quiz on Invertebrate taxonomy)
Lab: Antarctic Terrestrial Plant Research – Todd Rosenstiel

Oct 28  Primary Productivity from Aquatic to Terrestrial systems
LAB: Fish systematics

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Week 6

Nov 2  Fish Ecology and Adaptation
LAB: 1. Quiz on plant taxonomy
2. Assignment on fish: half the class will present species accounts for selected Antarctic fish species (to be assigned in class).

Nov 4  Life in Extreme Environments
LAB: 1. Videos
2. Discussion of READING SUMMARIES for Weeks 5 & 6

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Week 7

Nov 9  Seabird Identification and Ecology
LAB: 1 Quiz on fish taxonomy
2. Assignment on seabirds: half the class will present species accounts for selected seabird species (to be assigned in class).
3. Videos

Nov 11  HOLIDAY – Veterans Day

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Week 8

Nov 16  Penguin Identification and Ecology
LAB: videos

Nov 18  Marine Mammal Identification & Ecology
LAB: 1. Quiz on seabird and penguin taxonomy
2. Videos
3. Discussion of READING SUMMARIES for Weeks 7 & 8

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Week 9

Nov 23  Marine Mammal/Penguin Diving Physiology
LAB: 1. Videos
2. Discussion of READING SUMMARIES for Week 9

Nov 25  Antarctic Research
No Lab – HAPPY THANKSGIVING

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**Week 10**

### Nov 30

**Human Impacts**

**LAB: Assignment:** Research and present an example of the effects of human interaction (for ex, research or tourism), climate change, the impact of introduced biota (plants, invertebrates, vertebrates), etc.

### Dec 2

**MIDTERM EXAM #2** in class (will include a Quiz on marine mammal taxonomy)

**LAB: Class Wrap Up**

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**DEC 7 Mon. 15:30-17:20 Final Presentation**

**Final Presentation Assignment:** each student will be assigned an Explorer, and will be expected to present a 5-6 minute Power Point overviewing that individual’s involvement in Antarctica.

- **Maps, Field Guides and the Historical Book Summary** (Cherry-Garrard or Shackleton) are due at the final.

**READING ASSIGNMENTS:**

1-2 pg. summaries of each of these articles as indicated are due in the lab in which they are to be discussed (see syllabus)


**Week 2: Texts: McGonigal (36, 37-71);**

Barrett 1999. Antarctic climate history over the last 100 million years. Terra Antarctica Reports 3:53-72.


**Week 3**: Texts: McGonigal (42-51); Thomas (Chaps 1, 2, 3, 4, 5)
**For Monday**: CHOOSE A CURRENT JOURNAL ARTICLE OF YOUR CHOICE

Also

**Also: choose 1 of the following:**

**Week 4**: Texts: McGonigal (141, 148-155); Thomas (Chaps 6, 7)
**Week 5: Texts: McGonigal (138-145)**


*Also: choose 3 of the following*


**Week 6: McGonigal (153)**


*Also: choose 2 of the following articles*


Week 7: Texts: McGonigal (204-233); Thomas (Chap 8)
Choose 4 of the following articles

Week 8: Texts: McGonigal (156-203, 234-259); Thomas (Chap 8)

Week 9: Texts: McGonigal (262-381); Thomas (Chap 9)

**Week 10: Texts: Thomas (Chap 10); Antarctic Treaty System, CCAMLR, Legal framework for marine mammal conservation and protection**

**Also: choose 2 of the following articles: any of these can be topics for your presentation on human impact**

Siniff et al. 2008. Opinion: Projecting the effects of environmental change on

**Additional Titles of Interest**

**Basic:**
Antarctica, ed., W.N. Bonner and D.W.H. Walton
Antarctic Communities: Species, Structure and Survival, Ed. B. Battaglia, J. Valencia and D.W.H. Walton
Antarctic Ocean and Resources Variability, S.Z. El-Sayed
Biology of the Southern Ocean. G.A. Knox
The Crystal Desert: Summers in Antarctica, D.G. Campbell
A Natural History of the Antarctic: Life in the Freezer. A. Fothergill
Antarctica (a novel), K.S. Robinson
Antarctica (historical): Gabrielle Walker

**Seabirds and Penguins:**
Birds of the Antarctic and Sub-Antarctic, G.E. Watson
Antarctic Birds and Seals - A pocket guide by Sharon Chester
Field Guide to Seabirds of the World, P. Harrison
Penguin Biology, L.S. Davis and J.T. Darby
Penguins, B. Stonehouse
Watson, G.E. Birds of the Antarctic and Sub-Antarctic

**Marine Mammals and Fish:**
Antarctic Fishes. J. Eastman

**Physiology and Ecology:**
Cold Ocean Physiology, ed. H.O. Portner and R.C. Playle
Polar Ecology, B. Stonehouse
Biogeography and Ecology in Antarctica, ed. J. van Meighem and P. van Oye
Picture Books:
Penguins, W. Kaehler
Antarctic Splendor, F.S. Todd
Antarctic: Beyond the Southern Ocean, C. Monteath