

AOS/IES 520

Spring 2016
BIOCLIMATOLOGY
TTh 1:00-2:15 pm AOSS 811

3 credits

Professor Ankur Desai

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Office Hours: T 2:30-3:30 pm or by appointment

Web page: <https://learnuw.wisc.edu/> (login with your NetID to access course)

Course Materials

Required:

Bonan, Gordan. 2008. *Ecological Climatology: Concepts and Applications*, 2nd edition. Cambridge Press. ISBN: 978-0-521-69319-6.

Recommended:

Chapin III, F. Stuart. 2011. *Principles of Terrestrial Ecosystem Ecology*, 2nd edition. Springer. ISBN: 9781441995025

Schlessinger, W., and Bernhardt, E., *Biogeochemistry: An Analysis of Global Change*, 3rd edition. Academic Press. ISBN: 9780123858740

All books are available at University Bookstore and on reserve at the SSEC Library (3rd floor AOSS)

Course content

Bioclimatology is the study of the connection between **living organisms** and **climate**. We will investigate how climate systems and biological organisms operate and interact at the global scale and the implications of this for climate change, ecosystem ecology, and human land use.

Learning outcomes:

At the end of this 3-credit graduate course, student will be able to describe and apply the basic physics and biology of the bioclimate system and be able to:

- Quantitatively analyze how *ecosystem-relevant* processes influence the climate system
- Evaluate spatiotemporal patterns of *climate-relevant* features that most affect organisms
- Critically interpret ongoing research on how the two interact with changing land use and climate

Grading

Short problem sets and literature review response papers – 30%

Final group project (proposal 10% / report 10% / presentation 10%) – 30%

Two exams (20% each) – 40%

Scale: 92-100 A, 87-92 AB, 82-87 B, 75-82 BC, 70-75 C, 65-70 D, < 65 F

Course Structure

Classes will consist of standard lectures, and interactive discussion is encouraged. On most Thursdays, in addition to lecture, we will either review current and classical literature in bioclimatology or the most recently assigned problem set. Students are encouraged to work on the problem sets together and suggest literature for review. When doing literature reviews, every student will submit a one-page response paper. The final project will be a small group (3-4 people) integrative analysis of ecoclimatological data. The nature of the project will be selected through a proposal voting process. Final results will be presented in a group conference extended abstract and oral presentation at the end of semester.

Course Calendar

Part I. Climate System

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|------------------|--|
| Week 1 1/19;1/21 | Introduction to ecological climatology and system dynamics |
| Week 2 1/26;1/28 | Physics and dynamics of the climate system |
| Week 3 2/2;2/4 | Climate observations |
| Week 4 2/9;2/11 | General atmosphere and ocean circulation |
| Week 5 2/16;2/18 | Feedbacks, stability, and trends |

Part II. Ecosystems and Climate

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|------------------|---|
| Week 6 2/23;2/25 | Ecosystems and biomes |
| Week 7 3/1;3/3 | Ecosystem energetics Exam I |
| Week 8 3/8;3/10 | Ecosystem dynamics Research proposal due |
| Week 9 3/15;3/17 | Ecosystem-ocean-atmosphere interaction |
| Break | SPRING BREAK |

Part III. Biogeochemistry and Global Interactions

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|-------------------|---|
| Week 10 3/29;3/31 | Introduction to Biogeochemistry |
| Week 11 4/5;4/7 | Biogeochemistry and climate |
| Week 12 4/12;4/14 | Ecohydrology and climate |
| Week 13 4/19;4/21 | Anthropogenic effects and ecosystem resilience Exam II |

Part IV. Group Conference and Conclusion

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|-------------------|--|
| Week 14 4/26;4/28 | Final presentations |
| Week 15 5/3;5/5 | Final presentations and Conclusion Research paper due |

Accommodation Policy

Campus policy: “We believe in the right of all students who are enrolled at the University of Wisconsin-Madison to full and equal educational opportunity. Disability should not be the basis for exclusion from educational programs. All students are entitled to an accessible, accommodating, and supportive teaching and learning environment. ... Students are expected to inform faculty, in a timely manner, of their need for special instructional accommodations.”

Students requiring class accommodations due to a learning or physical disability must present documentation from the McBurney Disability Resource Center (<http://www.mcburney.wisc.edu/>) in the first week of class. Accommodations will be made in consultation with the McBurney Center.

Students who require temporary accommodations due to medical or psychological reasons should acquire documentation from University Health Services. Counseling is available from Counseling Services, University Health Services (<http://www.uhs.wisc.edu/>).