WELCOME TO GEOGRAPHY/BOTANY 338: ENVIRONMENTAL BIOGEOGRAPHY
Fall 2017

Schedule: Monday & Wednesday 2:30-3:45 pm, Science Hall 360
Credits: 3
Instructor: Professor Erika Marin-Spiotta
Email: marinspiotta@wisc.edu
Office: Science Hall 223
Office Hours: Tuesdays and Wednesdays 12:00-1:00 pm and by appointment.

Note: This course fulfills the Biological Science breadth requirement.

COURSE DESCRIPTION: This course takes an ecosystems approach to understand how physical -- climate, geologic history, soils -- and biological -- physiology, evolution, extinction, dispersal, competition, predation -- factors interact to affect the past, present and future distribution of terrestrial biomes and all levels of biodiversity: ecosystems, species and genes. A particular focus will be placed on the role of disturbance and to recent human-driven climatic and land-cover changes and biological invasions on differences in historical and current distributions of global biodiversity.

COURSE GOALS:
• To learn patterns and mechanisms of local to global gene, species, ecosystem and biome distributions
• To learn how past, current and future environmental change affect biogeography
• To learn how humans affect geographic patterns of biodiversity
• To learn how to apply concepts from biogeography to current environmental problems
• To learn how to read and interpret the primary literature, that is, scientific articles in peer-reviewed journals.

COURSE POLICY: I expect you to attend all lectures and come prepared to participate in discussion. I will take attendance. Please let me know if you need to miss three or more lectures. Please respect your fellow students, professor, and guest speakers and turn off the ringers on your cell phones and refrain from texting during class time. Non-class-related internet or computer use is not allowed during the class period. It is distracting to your fellow students and to the instructor.

REQUIRED READING: All readings will be posted as PDFs on Learn@UW (Desire2Learn)
• Selected research articles and book chapters as posted online

Supplementary texts (on reserve in the Helen C. White Hall Library):
• Biogeography - An Ecological and Evolutionary Approach by Cox and Moore (Blackwell Publishing)
• Biogeography 3rd Edition by Lomolino, Riddle and Brown (Sinauer)
- Biogeography - Space, Time and Life by MacDonald (2003) Wiley
- Foundations of Biogeography ed. by Lomolino, Sax and Brown (Chicago Press)
- Principles of Terrestrial Ecosystem Ecology by F.S. Chapin III, P.A. Matson, and H.A. Mooney (Springer)

**EVALUATION:**
Final letter grade is based on a percentage of points you earn out of a possible 200.
Exam 1: 40 points (20% of your grade)
Exam 2: 40 points (20%)
Exam 3: 40 points (20%)
Paper Outline: 5 points (2.5%)
Term Paper: 40 points (20%)
Peer-Review: 5 points (2.5%)
Reading Reflections: 10 points (5%)
Group presentations and participation during in-class discussions: 20 points (10%)
There will be no extra credit.

**EXAMS:** Exams will cover material from lectures, assigned readings, and in-class discussion and will consist of multiple choice, definition, short answer, and essay questions designed to gauge the extent students have acquired a basic literacy in biogeographical concepts. The third exam will predominantly focus on the last third of the course material, but students should be aware that the topics in biogeography build upon each other and so links to materials in previous lectures will be expected. **There is no exam during finals week.**

**TERM PAPER:** All paper topics should be approved by the instructor. Papers will be peer-reviewed by one of your classmates before final submission. Instructions will be provided when paper topics are due. All submissions are to be word-processed in 12-point font, double-spaced, left-justified and uploaded into the Dropbox on the Learn@UW (Desire2Learn) website. Provide citations for all data and arguments that are not your own. In scientific articles, it is usual practice to paraphrase results or conclusions from other articles as long as the exact wording is not copied and the original authors are given proper credit. The use of direct quotations is very uncommon unless the exact wording is necessary to prove a point. Please see separate paper instructions document.

**UNDERGRADUATE STUDENTS:**
Write a 6-page paper on the biogeography of a particular species, genus or family, and provide its current and historical patterns and mechanisms of distribution, conservation status, and life history (including important biological interactions and environmental requirements).

**GRADUATE STUDENTS:**
Write a 12-page paper on a controversy in Biogeography and state the problem, trace its origins in the literature, provide arguments on opposing sides from the peer-reviewed
literature, and what implications it has on current thinking and practice in conservation or sustainable use.

**Suggested Journals with Biogeographic Content:**
Ecography; Journal of Biogeography; Diversity and Distributions; Global Ecology and Biogeography; Progress in Physical Geography; Global Change Biology; Proceedings of the National Academy of Sciences; Nature; Science; Trends in Ecology & Evolution; Conservation Biology; American Naturalist; Annual Reviews in Ecology and Systematics; Biodiversity and Conservation; Biological Journal of the Linnean Society; Ecology; Ecological Applications; Molecular Ecology

**Tips on How to Read a Scientific Paper**
www.biochem.arizona.edu/classes/bioc568/papers.htm
www.bio.unc.edu/faculty/Khogan/HowToReadAScientificPaper.ppt

**SHORT ASSIGNMENTS:** During the semester, you will be asked to submit a brief summary or reading reflection of a research or news article to complement lecture material.

**PARTICIPATION:** I encourage in-class discussions of the lecture material and readings. Most class periods will consist of a 50 minute lecture and 25 minute discussion. In order to make this as productive and enjoyable as possible, I expect everybody to participate. Thus, you need to have read the papers ahead of time, bring questions, and complete assignments as given. On those days that we discuss a reading, each student must come prepared to share an opening discussion statement about the reading.

**QUESTIONS:** Students who ask questions tend to be able to build connections between course topics and fare better on exams. I am happy to entertain questions during lectures. At the beginning of each class period I will devote time for questions on any material from previous lectures. I will also answer questions submitted by email and on the Learn@UW course discussion board. I expect you to let me know if any of the material is confusing either in person before or after class, by email, or in my office hours. Feedback is welcome at any time.

**ACADEMIC INTEGRITY:** Academic honesty requires that the course work (drafts, reports, exams, papers) a student presents to an instructor honestly and accurately indicates the student's own academic efforts. Please review the university’s guidelines on proper conduct: http://students.wisc.edu/saja/misconduct/UWS14.html Some examples of academic misconduct (from the website) include: cutting and pasting text from articles or from the web without quotation marks or proper citation and paraphrasing from the web without crediting the source. When in doubt about how to properly cite something, come talk to me.

**ADDITIONAL RESOURCES FOR STUDENTS:**

- McBurney Disability Resource Center. We are happy to work with students who need additional accommodations. Please talk to one of the professors early on in the semester so we can best accommodate you. http://www.mcburney.wisc.edu/
• **Multicultural Student Center.** The MSC exists to make sure students of all backgrounds are successful at UW. [https://msc.wisc.edu](https://msc.wisc.edu)

• **GUTS (Greater University Tutoring Service) tutoring.** See their homepage to inquire about individual tutors/general tutoring sessions. [http://guts.studentorg.wisc.edu/](http://guts.studentorg.wisc.edu/)

• **UW Writing Center.** See their website for information about drop-in or scheduled appointments with expert writers. They will help with just about any type of writing assignments/needs. [http://www.writing.wisc.edu/](http://www.writing.wisc.edu/)

• **L&S Student and Academic Affairs.** See their website for issues regarding medical absences and other emergencies that may affect your ability to attend courses and complete coursework. [http://saa.ls.wisc.edu](http://saa.ls.wisc.edu)

• Any student facing food and/or housing insecurity and who believes this may affect their performance in the course, is urged to contact the Dean of Students for support: [https://doso.students.wisc.edu/student-assistance/](https://doso.students.wisc.edu/student-assistance/). Please notify one of the professors if you don't feel comfortable doing so, so they can help you access resources. As a student at the University of Wisconsin – Madison there are numerous resources available to you, including your Deans. Each student has two Deans, an **Academic Dean**, whose role is to assist students with academic matters pertaining to his/her/they respective School or College, and the **Dean of Students**, whose role is to assist students with personal matters.

Please let me know if you need any additional accommodations, I am happy to work with you.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture</th>
<th>Topic</th>
<th>Reading list (see details in footnotes) and Term Paper Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wed 6-Sep</td>
<td>1</td>
<td>Welcome and introduction to biogeography</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mon 11-Sep</td>
<td>2</td>
<td>Requirements for life: Biological context</td>
<td>Ch. 6 Terrestrial Proc. (1)</td>
</tr>
<tr>
<td></td>
<td>Wed 13-Sep</td>
<td>3</td>
<td>Requirements for life: Biological context</td>
<td>Ehleringer 2002 (2)</td>
</tr>
<tr>
<td>3</td>
<td>Mon 18-Sep</td>
<td>4</td>
<td>Requirements for life: Physical environments</td>
<td>Higgins et al. 2011 (3)</td>
</tr>
<tr>
<td></td>
<td>Wed 20-Sep</td>
<td>5</td>
<td>Requirements for life: Physical environments</td>
<td>The Global Climate System (4)</td>
</tr>
<tr>
<td>4</td>
<td>Mon 25-Sep</td>
<td>6</td>
<td>Geographic distributions: Biomes</td>
<td>Ch. 6 Biomes MacDonald 2003 (5)</td>
</tr>
<tr>
<td></td>
<td>Wed 27-Sep</td>
<td>7</td>
<td>Biological interactions &amp; Trophic dynamics</td>
<td>Predator-mediated coexist (6); Why is the world green? (7); Paper Topic due</td>
</tr>
<tr>
<td>5</td>
<td>Mon 2-Oct</td>
<td>8</td>
<td>Biological interactions &amp; Disturbance</td>
<td>Group presentation readings (8)</td>
</tr>
<tr>
<td></td>
<td>Wed 4-Oct</td>
<td>9</td>
<td>Species ranges</td>
<td>So Huge a Bignes-Dispersal (9); Pearson 2003 (10)</td>
</tr>
<tr>
<td>6</td>
<td>Mon 9-Oct</td>
<td>9</td>
<td>EXAM 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wed 11-Oct</td>
<td>10</td>
<td>Species ranges and dispersal</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Mon 16-Oct</td>
<td>11</td>
<td>Evolution and speciation</td>
<td>So Huge a Bignes-Evolution (11) &amp; Radiation (12);</td>
</tr>
<tr>
<td></td>
<td>Wed 18-Oct</td>
<td>12</td>
<td>Speciation and extinction</td>
<td>The Man Who Knew Islands (13) Paper Outline Due</td>
</tr>
<tr>
<td></td>
<td>Wed 25-Oct</td>
<td>14</td>
<td>Quaternary climate change</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mon 30-Oct</td>
<td>15</td>
<td>Biogeographic realms</td>
<td>Mercer 2003 (16)</td>
</tr>
<tr>
<td></td>
<td>Wed 1-Nov</td>
<td>16</td>
<td>Phylogeography &amp; biodiversity</td>
<td>Group presentation readings (17)</td>
</tr>
<tr>
<td>10</td>
<td>Mon 6-Nov</td>
<td>17</td>
<td>Phylogeography &amp; biodiversity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wed 8-Nov</td>
<td></td>
<td>EXAM 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Day</td>
<td>Week</td>
<td>Topic</td>
<td>References</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>11 Mon</td>
<td>13-Nov</td>
<td>18</td>
<td>Island biogeography</td>
<td>Island Theory (18); Walter 2004 (19)</td>
</tr>
<tr>
<td>Wed</td>
<td>15-Nov</td>
<td>19</td>
<td>Conservation biogeography</td>
<td>Prugh et al. 2008 (20); Mendenhall et al. 2014 (21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Draft to Peer Due</td>
<td></td>
</tr>
<tr>
<td>12 Mon</td>
<td>20-Nov</td>
<td>20</td>
<td>Humans as a biogeographic force: Domestication</td>
<td>Larson et al. 2014 (22)</td>
</tr>
<tr>
<td>Wed</td>
<td>22-Nov</td>
<td></td>
<td>No class - Happy Thanksgiving</td>
<td></td>
</tr>
<tr>
<td>13 Mon</td>
<td>27-Nov</td>
<td>21</td>
<td>Humans as a biogeographic force: Agriculture</td>
<td></td>
</tr>
<tr>
<td>Wed</td>
<td>29-Nov</td>
<td>22</td>
<td>Climate change &amp; disease biogeography</td>
<td>Smith 2010 (23)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peer Review Due</td>
<td></td>
</tr>
<tr>
<td>14 Mon</td>
<td>4-Dec</td>
<td>23</td>
<td>Biogeography in a changing world</td>
<td>Davis 2011 (24); Response to Davis (25)</td>
</tr>
<tr>
<td>Wed</td>
<td>6-Dec</td>
<td>24</td>
<td>New topics in biogeography</td>
<td></td>
</tr>
<tr>
<td>15 Mon</td>
<td>11-Dec</td>
<td></td>
<td>EXAM 3</td>
<td></td>
</tr>
<tr>
<td>Wed</td>
<td>13-Dec</td>
<td></td>
<td>No class</td>
<td>Final Paper Due</td>
</tr>
</tbody>
</table>

**Reading details: (All available on course website Learn at UW)**

6. Life of every color and kind (Paine 1966). ECOmotion Studios -
   https://www.youtube.com/watch?v=FsEOBZbxBr0&feature=youtu.be

7. The World is Green (Hairston, Smith and Slobodkin 1960). ECOmotion Studios -
   https://uwmad.courses.wisconsin.edu/d2l/le/content/3356237/viewContent/20654781/View

8. Group presentation readings:
   A. Trophic downgrading
   B. Nutrient subsidies
   C. Trophic cascades
   D. Disturbance tradeoffs

E. Density dependence hypothesis


9. The Song of the Dodo, pages 141-149


11. The Song of the Dodo, So Huge a Bignes, pages 128-137

12. The Song of the Dodo, So Huge a Bignes, pages 217-234


17. Group presentation readings:
   A. Madagascar
B. Glacial refugia

C. Beringia

D. Biotic ferries and dispersal

E. Sky islands

18. The Song of the Dodo, Island theory, pages 409-415


25. Correspondence (2011; responses to Davis et al.). Nature 475:37