Global Change in Freshwater Ecosystems
Graduate level (3 credit hours)
Meets Tuesday periods 3 and 4 (9:35 -11:30) and Thursday period 3 (9:35-10:25)

Prerequisites: 2 semesters of undergraduate general biology coursework

Professor: Dr. Lindsey Reisinger
lreisinger1@ufl.edu
(352) 294-1355
Office hours: by appointment

Text: Readings will consist of peer reviewed papers. There is no book for this course.

Course Description:
This course is designed to provide students with an understanding of human impacts in freshwater ecosystems and challenges and approaches for conserving freshwater diversity and ecosystem services.

Objectives:
At the end of the course, students will be able to:

- Describe the major drivers of global change in freshwater ecosystems (water availability and flow, pollution, land use, browning, overexploitation, biological invasions, and climate change) as well as how these drivers interact
- Describe how drivers of global change are currently being studied and the management efforts that may mitigate their effects
- Find and summarize scientific research related to global change in freshwater ecosystems
- Effectively present scientific information
- Critically evaluate scientific literature focused on global change in freshwater ecosystems

Class Format:
The class will be structured around reading and discussion of the primary literature on different topics surrounding global change in freshwater ecosystems. Readings each week will include one review paper that summarizes current knowledge on a topic as well as two original research papers. Reading and discussing the original research papers will be important for critically evaluating scientific evidence on the topic.

Discussion of the readings will begin online before each class. A computer with internet connection is required. The UF Canvas E-Learning site can be accessed at http://elearning.ufl.edu/ using your Gatorlink account. Online discussion will focus on the review paper assigned each week. Students will post their thoughts and questions about the review paper and respond to questions provided by the instructor.

In addition, students will answer summary reading questions on each of the two original research papers assigned each week. These questions will focus on the major questions and findings, how the paper fits in with other research, and the quality of the evidence. Class discussions will focus on the original research papers.
Each student will lead three discussions in person during the semester to learn to effectively present scientific material and gain a deeper understanding of the topic. When leading a discussion, students will prepare a presentation (15 minutes) that introduces additional material on the topic of the day. Students will also prepare questions to stimulate class discussion. Students will meet with the professor prior to the class to go over their plan for the presentation and leading the discussion.

**Assignments/ Evaluation of Student Learning:**
Assignments will be described in class, and grading rubrics will be provided. Participation in class discussion (25%)
Summary reading questions (15%) and online discussion (15%)
Presentation 1 (5%) and leading class discussion 1 (5%)
Presentation 2 (10%) and leading class discussion 2 (5%)
Presentation 3 (15%) and leading class discussion 3 (5%)
Grade point allocation: A 94-100%; A- 90-93; B+ 86-89; B 83-85; B- 80-82; C+ 76-79; C 73-75; C- 70-72;
D+ 66-69; D 63-65; D- 60-62; E <60%

**Schedule of Class Topics:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Biodiversity and drivers of change</td>
<td>Dudgeon et al 2006*, Jonsson &amp; Malmqvist 2000</td>
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<td>2</td>
<td>Biodiversity and drivers of change</td>
<td>Carpenter et al. 2011*</td>
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<td>Capps et al. 2015, Downing et al. 2014</td>
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<td>3</td>
<td>Water availability</td>
<td>Baron et al. 2002*</td>
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<td>Aroviita &amp; Hamalainen 2008, Galbraith et al. 2010</td>
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<td>4</td>
<td>Flow modification</td>
<td>Poff &amp; Hart 2002*</td>
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<td>Carlisle et al. 2011, Kelly et al. 2017</td>
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<td>5</td>
<td>Pollution – Nutrients</td>
<td>Smith et al. 1999*</td>
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<td>Abell et al. 2010, Negishi et al. 2019</td>
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<td>6</td>
<td>Pollution – Organic chemicals and metals</td>
<td>Bernhardt et al. 2017*</td>
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<td>Malaj et al. 2014, Hudelson et al. 2019</td>
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<td>7</td>
<td>Pollution – Pharmaceuticals, salt, microplastics</td>
<td>Richmond et al. 2017*</td>
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<td>McCormick et al. 2016, Dugan et al. 2017</td>
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<td>8</td>
<td>Land use change</td>
<td>Bernhardt &amp; Palmer 2011*</td>
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<td>Roy et al. 2006, Fierro et al. 2019</td>
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<td>9</td>
<td>Browning</td>
<td>Creed et al. 2018*</td>
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<td>Craig et al. 2017a, Hessen et al. 2017</td>
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<td>10</td>
<td>Overexploitation</td>
<td>Allan et al. 2005*</td>
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<td>Estes et al. 2011, Taylor et al. 2006</td>
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<td>11</td>
<td>Invasion – Vectors and drivers of success</td>
<td>Vander Zanden et al. 2010*</td>
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<td>Gherardi 2006, Davis &amp; Darling 2017</td>
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<td>12</td>
<td>Invasion – Impacts</td>
<td>Poulin et al. 2011*</td>
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<td>Neill et al. 2014, Walsh et al. 2017</td>
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<td>13</td>
<td>Climate change</td>
<td>Knouft &amp; Ficklin 2017*</td>
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<td>Kraemer et al. 2017, Till et al. 2019</td>
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<td>14</td>
<td>Combined stressors</td>
<td>Craig et al. 2017*</td>
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<td>15</td>
<td>Combined stressors</td>
<td>Vaughn 2010*</td>
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<td>Schafer et al. 2016, Gutowski et al. 2019</td>
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*review paper
Reading:

1. Biodiversity and drivers of change

2. Biodiversity and drivers of change continued

3. Water availability

4. Flow modification

5. Pollution – Nutrients

6. Pollution – Organic chemicals and metals

7. Pollution – Pharmaceuticals, salt, and microplastics


8. Land use change


9. Browning


10. Overexploitation


11. Invasions – Vectors and drivers of success


12. Invasions - Impacts


13. Climate change


14. Combined stressors


15. Combined stressors continued


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**Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.
**Course Evaluation**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at [https://evaluations.ufl.edu](https://evaluations.ufl.edu). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at [https://evaluations.ufl.edu/results/](https://evaluations.ufl.edu/results/).

**University Honesty Policy**

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.”

The Honor Code ([https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/](https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/)) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this course.

**Counseling and Wellness Center**

Contact information for the Counseling and Wellness Center: [http://www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/), (352) 392-1575

Contact information for University Police Department: (352) 392-1111 or 9-1-1 for emergencies.