Ecology in a Changing Climate — GENERAL 2020

CONS 310 (3 credits)
Class: Tu Th 11-12:30, FSC 1222
Professor: Elizabeth Wolkovich
TA: Mira Garner

Important: Keep an eye out for an updated (and hyperlinked) syllabus on Canvas site. This is a GENERAL syllabus and subject to change in future years. [1]

	Date	Topic	In-class
Tu	Jan 7	Introduction to the course	
Th	Jan 9	Physical science basis I	
Tu	Jan 14	Physical science basis II	
Th	Jan 16	Physical science basis III	(snowy)
Tu	Jan 21	Physical science basis IV	PD: 97% agreement
Th	Jan 23		Myths debate
Tu	Jan 28	Levels of ecology	Quiz (physical science)
Th	Jan 30	Phenological responses	PD: Phenology paper
Tu	Feb 4	Metabolism & behavioural responses	
Th	Feb 6	Birds & climate change (Martin)	
Tu	Feb 11	Evolutionary responses	
Th	Feb 13	Range shift responses I: Tree lines	PD on ranges
	Feb 18-21	*Break*	
Tu	Feb 25	Range shift responses I	
Th	Feb 27	Range shift responses II: Beetles	
Tu	Mar 3	Community responses	PD: Great Tit
Th	Mar 5	Community responses	
Tu	Mar 10	Ecosystem responses	PD: Tundra shrubs
Th	Mar 12	Ecosystem responses	Quiz (stay/move responses)
Tu	Mar 17	Climate modes & stochastic events	PD: Practice quiz
Th	Mar 19	Social impacts (Donner)	
Tu	Mar 24	Oceans (Harley)	Final project prep
Th	Mar 26	Quiz day	Quiz
Tu	Mar 31	Paths forward	
Th	Apr 2	Wrap-up	Presentations
Tu	Apr 7	You're done!	Presentations

[1] PD: Paper discussion – we'll be discussing a scientific paper you must read, digest and post questions about. This is a large component of your grade, so important classes to not miss.

Course overview: Anthropogenic climate change has already risen the global temperature nearly one degree, with far more radical warming predicted in the coming decades. With this elevated temperature regime come shifts in frosts, precipitation, storms and extremes. Alongside these major physical impacts many aspects of ecological systems are changing. This course will build on the fundamental organizing units of ecology: individuals, populations, species, communities and ecosystems to build a framework to understand what has shifted in the last 40 years and what we may expect by the end of the century.

This class will be lecture and discussion-based with students expected to actively participate and work with one another in and outside of class on course projects. Knowledge of fundamental concepts in ecology and evolution will be key for keeping pace with the course.

Course materials: There is no textbook, most material will be covered in class, so attending class and taking good notes is critical. There will be regular assigned videos and readings, which will be posted on the Canvas site. *Please keep an eye on the Canvas site for materials.* A sample of these materials is included below.

Anderegg. 2010. Diagnosis Earth: The Climate Change Debate. *The NEA Higher Education Journal*: Fall 2010.

Colautti *et al.* 2016. Phenological shifts of native and invasive species under climate change: insights from the *Boechera-Lythrum* model. *Philosophical Transactions B.* 372: 20160032.

Davis & Shaw. 2001. Range Shifts and Adaptive Responses to Quaternary Climate Change. *Science*: 292 (27).

Guminski. 2016. Understanding Uncertainty: How to Improve Communication Around Climate Change Evidence. *Chicago Policy Review.* 22 August.

Hayhoe. 2018. Oh Canada – Global Weirding.

Myers-Smith *et al.* 2011. Shrub expansion in tundra ecosystems: dynamics, impacts and research priorities. *Environmental Research Letters*: 6 045509.

Trant & Hermanutz. 2014. Advancing towards novel tree lines? A multispecies approach to recent tree line dynamics in subarctic alpine Labrador, northern Canada. *Journal of Biogeography*: doi:10.1111/jbi.12287.

VICE: The Cost Of Climate Change Wrecking Your City.

Wallace-Wells. 2017. The Uninhabitable Earth (annotated). *New York Magazine*: 10 July.

Course objectives:

- Explain the basic science of anthropogenic climate change.
- Describe the major physical and biological evidence of climate change.
- Debunk the top myths related to climate change impacts on our physical and biological world.
- Describe the organizing levels of ecology and how they are relevant to understanding and predicting climate change impacts.
- Describe the major ecological impacts of climate change and how they mechanistically occur.
- Understand the major sources of uncertainty about how much warming will occur in the future, and over what biological timescales.
- Explain what will happen to local, regional and global ecosystems under different warming scenarios.
- Be able to read and interpret scientific papers on climate change. This includes understanding a paper's basic study design and how the authors detect and attribute biological changes to climate change.

Office hours: Your TA, Mira Garner, will have office hours Monday 1-2pm and by appointment also.

Email: Your first contact for course questions (assignments, clarifications on lecture materials, etc.) should be your TA (contact info on first page). If your TA cannot answer your questions, or the questions are of a nature that you feel you cannot discuss with your TA, then please contact me. I check email several times a day between 2pm and 6pm (weekdays only), so please plan accordingly.

Expectations

- Attend class and take notes. As climate change is a process underway now and the science on it is actively advancing, there is no textbook to refer to. This means to do well in the course you need to attend class and take excellent notes, and review the materials posted on Canvas.
- Do the assigned homework! Pop-up quizzes on the homework will be given and impact your participation grade.

- Participate actively in class. This means answering questions asked to the class in general, offering ideas and opinions in small groups and sharing the discussion when in small groups–make sure that both your voice and the voices of others in your group are equally heard.
- Complete all assignments (questions, quizzes, debates and final project). Note that your in-class participation grade is based on participating actively in-class, to do this you must also attend classes. Thus, missing too many classes will impact your in-class participation grade.

Projects, debates and quizzes during term: In addition to reading all the papers, preparing questions about them, being an active participant in class, and leading a discussion, you will have the following assignments during term.

- Read and discuss five scientific papers (minimum) over term and ...
- Post questions on the papers (see below).
- Participate actively in the climate change myths debate.
- Prepare and submit quiz questions (due TWO classes before the quiz; see below).
- Take four quizzes during term; one of which will test you ability and skill in reading and interpreting scientific papers.
- Prepare a final project (see below).

Discussion questions: You need to post **two** questions on the assigned papers for discussion to the Canvas site **by 2pm the day before class**. These questions should be clear, spark interesting discussion and show that you have read and thought about the paper. Feel free to also post any general questions on the paper methods, terminology etc.—but note that these do **not** count towards your two questions.

To post your questions visit the course Canvas site where there will be an assignment part to each paper discussion.

Quizzes and quiz questions: There will be three quizzes during term of 5 or more questions (multiple choice, fill in the blank, short answer) designed to test your comprehension of recent course materials. One week before each of these quizzes you must submit two possible questions for the quiz (multiple choice, fill in the blank, short answer). These questions are not used on the quiz but help to gauge what materials have been well-covered, or not as well covered, thus allowing me to give extra review to necessary areas before the

quizzes. There is also one final quiz towards the end of term designed to test your ability and skill in reading and interpreting scientific papers.

Final report: Final report assignments vary from term to term and are designed for your to show your breadth of knowledge from term and how well you can connect across topics. The project will be assigned at least two weeks before the end of term.

University Policies: UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available here.

And a few more policies: Please do not make any recordings in class. If you wish to share course materials with anyone not enrolled in the class, please contact the instructor first.

Grading

In-class participation	15 points
Paper discussion questions	15 points
Quiz questions	5 points
Climate myths debate	10 points
Quizzes during term (4 total)	40 points
Final report	15 points
Total	**100 points**