# Cover Sheet: Request 14338

### WIS 4XXX The Ecology of Climate Change

**Info**

| | |
|---|---|
| Process | Course\|New\|Ugrad/Pro |
| Status | Pending at PV - University Curriculum Committee (UCC) |
| Submitter | Brett Scheffers brett.scheffers@ufl.edu |
| Created | 10/14/2019 2:29:19 PM |
| Updated | 12/19/2019 2:57:54 PM |
| Description of request | New undergraduate course |

**Actions**

| Step | Status | Group | User | Comment | Updated |
|---|---|---|---|---|---|
| Department | Approved | CALS - Wildlife Ecology and Conservation 514947000 | Eric Hellgren | | 10/18/2019 |
| BSC_- consult - Scheffers,Brett.pdf<br>Geological Sciences_ Course Consult - The Ecology of Climate Change_ Scheffers,Brett.pdf | | | | | 10/14/2019<br>10/14/2019 |
| College | Approved | CALS - College of Agricultural and Life Sciences | Joel H Brendemuhl | Edits requested by the CALS CC have been addressed. | 12/19/2019 |
| The Ecology of Climate Change_Chair support for title (2).pdf<br>AcademicApproval_Syllabus_WIS 4934_Ecological_Responses_Climate_Change_2019_JHB edits.docx | | | | | 10/22/2019<br>12/19/2019 |
| University Curriculum Committee | Pending | PV - University Curriculum Committee (UCC) | | | 12/19/2019 |
| No document changes | | | | | |
| Statewide Course Numbering System | | | | | |
| No document changes | | | | | |
| Office of the Registrar | | | | | |
| No document changes | | | | | |
| Student Academic Support System | | | | | |
| No document changes | | | | | |
| Catalog | | | | | |
| No document changes | | | | | |
| College Notified | | | | | |
| No document changes | | | | | |

# Course|New for request 14338

## Info

**Request:** WIS 4XXX The Ecology of Climate Change
**Description of request:** New undergraduate course
**Submitter:** Joel H Brendemuhl brendj@ufl.edu
**Created:** 12/19/2019 2:57:10 PM
**Form version:** 5

## Responses

**Recommended Prefix** WIS
**Course Level** 4
**Number** XXX
**Category of Instruction** Intermediate
**Lab Code** None
**Course Title** The Ecology of Climate Change
**Transcript Title** Ecology Climat Change
**Degree Type** Baccalaureate

**Delivery Method(s)** On-Campus
**Co-Listing** No

**Effective Term** Earliest Available
**Effective Year** Earliest Available
**Rotating Topic?** No
**Repeatable Credit?** No

**Amount of Credit** 3

**S/U Only?** No
**Contact Type** Regularly Scheduled
**Weekly Contact Hours** 3
**Course Description** This course provides a broad overview of the ecological responses to climate change on the Earth. Students will learn about ecological processes, spanning genetics, physiology and behavior, morphology, phenology and distribution, and up through species interaction, communities and ecosystems and how climate change impacts them.

**Prerequisites** BSC 2011
**Co-requisites** No co-requisites are required.
**Rationale and Placement in Curriculum** Climate change is arguably the single greatest threat to nature and society. The Ecology of Climate Change will provide a broad overview of ecological patterns and processes in climate change science. Students will gain an understanding of how climate change as well as other human disturbances impact ecological processes from the smallest gene to largest ecosystem level. We will focus on observed impacts rather than predicted impacts.
**Course Objectives** We will thoroughly discuss and critique a large literature that addresses the impacts of global change on a range of ecological processes from genes to entire biomes. The purpose of these discussions will be to assess the objectives of each published paper, determine whether the science appropriately matches the objectives and contrast findings to the larger literature within global change biology. Importantly, the literature will complement your research activities and add breadth to your observations and interpretations of results.

Our discussion format follows a “think-pair-share” format. This activity first asks students to consider a question on their own, and then provides an opportunity for students to discuss it in small groups, and finally together with the whole class.

This course is divided into three central components: 1) class lecture, 2) class discussion, and 3) natural history observation/out-of-class exercises.

The course will cover genetic, physiology and behavior, morphology of species, their phenology and distributions, up through species interaction, communities and ecosystems. Throughout the semester students will execute several research exercises that complement discussions and readings and emphasize the scientific process and how it is applied in climate change science.

Research Projects: Students will conduct a series of research activities on the morphology, physiology and activity patterns of animals. This includes a study on temperature across the UF campus and short projects involving the invasive brown anole (Anolis sagrei) between urban gardens and forested sites. Students visit the Butterfly Rainforest and other taxonomic collections available through the Florida Museum of Natural History. The objective of these short projects (and a broader objective of the class) is to allow each student the freedom to critically think about the research/scientific process and to allow students to build a personal research-based relationship with the content from their readings.

The content of this course is implemented through class lecture, class discussion, and natural history observation/out-of-class exercises that allows students to gain hands-on experience with the core ecological processes that they read about in their readings. Success of learning from class readings, lecture, and discussion is measured from a series of short quizzes and two exams and the critical application of this content is measured in a series of short research reports that students write for their short research exercises.

**Course Textbook(s) and/or Other Assigned Reading** The course will consist of discussions of readings from a wide variety of sources, including both technical (e.g., scientific literature) and non-technical material (e.g., newspaper articles, web links, video). My objective for readings is to teach climate change ecology to student by using the most up-to-date publications on the topic. As such, most readings in my course are published in the last 10 years.

Readings fro beginning to end of class are as follows:

Williams et al. 2010 An integrated framework on assessing climate change vulnerability
Optional reading: IPCC 2014 (synthesis report)
Zeuss et al. 2013 on butterfly melanism
Pistone et al. 2014 Albedo and darkening of the Arctic
Laloe et al. 2014 Rising temperatures and sea turtle rookeries
Jensen et al 2018 Feminization of turtles
Fan et al 2014 Cyclic color change and photoperiods
Sunday et al 2014 Thermal safety margins across latitude
Sharma et al 2016 Monks record of climate change
Geerts et al 2015 Rapid evolution in water flea
Franks 2008 Rapid evolution in plants
Sunday et al 2014 on thermal tolerance
Kolbe et al 2014 Brown anole minimum and maximum tolerable temperatures
Gils et al 2016 Red knot fitness and climate change
Agrawal 2001 Evolution and phenotypic plasticity
Phillips, Weeks, and Hoffman on genetic diversity
Georgina Mace's "Who's conservation" - ethics in conservation
Mayor et al 2017 Bird and plant phenology in North America
Optional reading: Gunderson and Leal 2012 Geographic variation in anole activity patterns
Araujo et al 2008 Quaternary climate change and frog diversity
Sandel et al 2011 Climate change velocity and endemism
De Frenne et al 2013 Microclimate moderates macroclimate warming
Scheffers et al 2017 Dispersal and arboreality
Freeman and Freeman 2014 Bird range shifts in PNG
Chen et al 2011 Global analysis of distribution shifts in animals
Optional reading: Poloczanska et al 2016 Marine fish distribution shifts in response to climate change
Frishkoff et al 2016 on habitat conversation and climate change favoring the same species

Group readings for puzzle:
1. Raffel et al 2015 Proc B
2. Puschendorf et al 2011 Cons Bio
3. Scheffers et al 2014 GCB

4. Greenspan et al 2017 Sci Reports

Kerr et al 2015 Climate change impacts on bumblebees
Verges et al 2014 Tropicalization of temperate zones
Optional reading: Fossheim et al 2015 Borealization of tundra zones
Stuart et al 2014 on rapid evolution in response to invasion
Optional reading:Gifford and Kozak 2012 Islands in the sky/squeezed at the top
Wernberg et al 2016 Phase/Regime shift in marine kelp forests
Bennett et al 2015 Tropical herbivores provide resilience against climate change

**Weekly Schedule of Topics** Below is a list of weekly scheduled topics

Organisms

Lecture Topics: Course Introduction, IPCC, and climate change assessments
Learning Objectives: Obtain overview of current knowledge of climate change and how to assess organism vulnerability to climate change

Lecture Topics: Climate change impacts on species morphology (color)
Learning Objectives: Discover how climate change interacts with species morphology traits (size, color, shape).

On-campus field trip - Visit to Butterfly Rainforest and McGuire Center - see how museums can be used in climate change ecology

Lecture Topics: Climate change impacts on behavior and thermoregulation
Learning Objectives: Appreciate the complexity of climate change impacts

On-campus field trip -Visit to FLMNH and collections - see how museums can be used in climate change ecology

Lecture Topics: Climate change impacts on physiology and genetics
Learning Objectives: What is phenotypic plasticity and why is it important under climate change

Lecture Topic: Brown Anole ecology
Learning Objectives: Begin initial observations and construction of independent research on brown anoles

Lecture Topics: Brown Anole survey Overview
Learning Objectives: Develop a better understanding of the basis for species distribution models

On-campus field trip -Visit to Harn Art Museum and art collections - merging art and science - thinking creatively about climate change

Species and Populations

Lecture Topics: Climate change impacts on morphology (shape)
Learning Objectives: Appreciate the link between phenotypic plasticity and climate change

Guest lecture by Leslie Thiele of University of Florida
Lecture Topics: Rethinking population-level conservation under climate change
Learning Objectives: Critically think about traditional conservation science and how it might change in the future

Guest lecture by Dr. Matt Luskin of Nanyang Technological University
Lecture Topics: Climate change impacts on phenology
Learning Objectives: Seasonal shifts in life-history traits in animals

Guest Lecture – Rebecca Senior
Lecture Topics: Climate change in space and time
Learning Objectives: The importance of both historical and current climate in shaping species distributions

Lecture Topics: Species redistribution: what is a native species under climate change?
Learning Objectives: To what extent are species changing their distributions to climate change and does this change our traditional view of conservation

Lecture Topics: Synergistic effects of climate change and habitat loss
Learning Objectives: Climate change, habitat fragmentation and other disturbances are interacting with amplified impacts on species

Interactions Among Organisms

Lecture Topics: Community assembly/disassembly under climate change
Learning Objectives: The scale at which communities are re-distributing in response to climate change

Lecture Topics: Competitive interactions under climate change
Learning Objectives: Understand the complexity of ecological interactions and processes and how they complicate interpretations of climate change impacts

Lecture Topics: Phase/Regime shifts under climate change
Learning Objectives: Understand the sheer magnitude of ecosystem level responses to climate change

**Grading Scheme** To motivate students to do the reading prior to class and to get students thinking about the topic, there will be quizzes throughout the semester (in class); quizzes will cover readings & lecture material for the week.

Multiple writing assignments will be assignment throughout the semester. For example, students will perform a full climate change vulnerability assessment on a species of their choice.

Students will write two research reports on the research assignments. Each report will cover class research projects and the readings.

One exam will be provided at mid-semester and a final exam at the end of the semester. Exams will cover class readings, in-class discussion, and research projects.

There are:
7 quizzes at 5 points each - total 35 points
4 assignments: Integrated framework (10 points), initial design of brown anole (10 points), initial survey (5 points), survey data collection (12 points) - total 37 points
2 written reports/essays - Temperature gradients and thermoregulation (20 points) and Anole distributions in urban landscapes (22 points) - total 42 points
2 exams - Mid-term exam (10 points) and Final exam (27 points) - total 37 points

Of 151 possible points assignment breakdown by percentages as such:
Quizzes - 23%
Assignments - 24.5%
Reports - 28%
Exams - 24.5%

Letter Grade in order:

| A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- | F |
|---|---|---|---|---|---|---|---|---|---|---|---|
| % | | | | | | | | | | | |
| 93-100 | | | | | | | | | | | |

90-92.9
87-89.9
83-86.9
80-82.9
77-79.9
73-76.9
70-72.9
67-69.9
63-66.9
60-62.9
<60

**Instructor(s)** Brett Scheffers
**Attendance & Make-up** Yes
**Accomodations** Yes
**UF Grading Policies for assigning Grade Points** Yes
**Course Evaluation Policy** Yes

**SYLLABUS 2020**

**Class Periods:**
Tuesday; period 2-3 (08:30 – 10:25 am)
Thursday **;** period 3 (09:35 -10:25 am)
**Room:** 238 Mechanical and Aerospace Engineering, building B

**Instructor:** Dr. Brett Scheffers
**Office:** Building 0087 (South of Newins Ziegler)
**Email:** brett.scheffers@ufl.edu
**Phone:** 352. 846.0570
**Contact/Office hours:** Tuesdays 1030 am-12pm in office #7; building 87. Feel free to email me at any time. I will do my best to respond to emails within 24 hours. (Please email the instructor on Canvas).
**Weekly course schedule** : See below

**UF course catalog description:** This course provides a broad overview of the ecological responses to climate change on the Earth. Students will learn about ecological processes, spanning genetics, physiology and behavior, morphology, phenology and distribution, and up through species interaction, communities and ecosystems and how climate change impacts them.

**Additional Course Description:**
*The Ecology of Climate Change* will provide a broad overview of patterns and processes in climate change science. Students will gain an understanding of how climate change as well as other human disturbances impact ecological processes from the smallest gene to largest ecosystem level. We will focus on observed impacts rather than predicted impacts.

**Course Format:**
This course is divided into three central components: 1) class lecture, 2) class discussion, and 3) natural history observation/out-of-class exercises. Various materials will be posted for students to download at the course Canvas site.

The course will consist of discussions of readings from a wide variety of sources, including both technical (e.g., scientific literature) and non-technical material (e.g., newspaper articles, web links, video).

Primary topics of the course cover genetic, physiology, behavior and morphology of species, their phenology and distributions, up through species interaction, communities and ecosystems. Throughout the semester students will execute several research exercises that complement discussions and readings and emphasize the scientific process and how it is applied in climate change science.

*Research Projects:* You will conduct a series of research activities on the morphology, physiology and activity patterns of animals. This includes a study on temperature across the UF campus and short projects involving the invasive brown anole ( *Anolis sagrei* ) between urban gardens and forested sites. We will visit the Butterfly Rainforest and other taxonomic collections available through the Florida Museum of Natural History. The objective of these projects (and a broader objective of the class) is to allow you the freedom to critically think about the research/scientific process and to allow you to build a personal research-based relationship with the content from your readings.

*Discussion* : We will thoroughly discuss and critique a large literature that addresses the impacts of global change on a range of ecological processes from genes to entire biomes. The purpose of these discussions will be to assess the objectives of each published paper, determine whether the science appropriately matches the objectives and contrast findings to the larger literature within global change biology. Importantly, the literature will complement your research activities and add breadth to your observations and interpretations of results.

Our discussion format follows a “think-pair-share” format. This activity first asks students to consider a question on their own, and then provides an opportunity for students to discuss it in small groups, and finally together with the whole class.

**Course materials/website:** All course readings, announcements, links to videos, grades, etc will be available on the Canvas e-learning website. **All email exchanges with the instructor should also occur in Canvas.** You will need your Gatorlink username and password to log into Canvas at http://elearning.ufl.edu/

**Canvas site navigation (3 important tabs to remember): Home** has background information for course **; Syllabus** contains the syllabus for the course as a download **; Modules** contains all content for course (this is a very important tab for getting week-to-week information for each class period).

**Course readings/course text:** All readings are found on the **Modules** tab for each week or under the **Files** tab. There is no assigned textbook for this course.

**Suggested Text:** There are no textbooks for this course. Please see the outline of readings below.

**Prerequisite:** BSC 2011

**Course breakdown:** In total, students will review 20-30 academic and popular articles (depending on class momentum) pertaining to climate change and global change biology. The class includes 7 quizzes on readings, 2 research/writing activities and 4 assignments. There will be a mid-term and final exam. Please see the *assignment table* for a break down of assignments, grades, and workload intensity for the semester.

**Assessments:**

**Quizzes:** Tentatively, there are 7 quizzes given during the course (~1 quiz per week). Quiz questions are derived from information delivered in class lectures, assigned readings, and short research activities (when applicable).

The number of readings covered by a particular quiz varies from 1-3, depending on the assigned readings in a week. Read the reading assignments before you attempt the quizzes! You must take quizzes online in Canvas at the beginning of class. Quiz questions are multiple choice and true/false. Questions are randomly drawn from a larger pool by the Canvas system. Each quiz has 5-10 questions. Quizzes are timed, and the time allotted for each quiz is proportional to the number of questions . Once you start a quiz in Canvas you must finish it in the allotted time—the "clock keeps ticking" in Canvas as soon as you open a quiz and only stops after the allotted time has passed. Quizzes must be completed before their closing date and time.

Weekly quizzes (including the Syllabus Quiz) are worth a total of 35 points (each question is worth 0.5 - 1 point). Consult the Critical Dates & Deadlines table below for a list of quizzes. In order to "make-up" a quiz, students must provide a legitimate, documented excuse for not completing the quiz on time. Access quizzes at the Module page in Canvas.

**Missed Quizzes** can only be taken with instructor approval. To make up a missed semester quiz students must provide a legitimate, documented excuse as to why the exam was missed. Please make arrangements with the instructor ahead of time or immediately following a missed exam. Depending on the circumstance, students may be required to take a cumulative, written assignment at the end of the semester to make up for a missed semester quiz.

**Assignments:** There are 4 assignments and 2 written reports/essays. Please see the below syllabus, assignment table for details pertaining to points and due dates.

**Exam:** There will be a exam that covers readings, class discussions and assignments.

**Communication Policy:** Your questions and comments are very important to me. I will strive to respond to all emails within 24 hours (48 hours over weekends and holidays).

**Attendance and Assignment Make-up Policy:**
Students are expected to attend and participate during the assigned class time. Assignment due dates are listed in the syllabus. Assignments are due at the beginning of class. **Assignments can be turned in within 24 hours of the due date for 15% off, and 48 hours for 30% off. No late assignments will be accepted after 48 hours.**

We abide by the university attendance regulations. Please see the university attendance policy for acceptable absences, documentation required and policies for any missed assignments. You must contact me within 24 hours of an approved absence to arrange for make-ups or any late assignments (if appropriate).
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

**Extra Credit**
There are no extra credit assignments planned for the course. However, extra credit may be

There are no extra credit assignments planned for the course. However, extra credit may be offered at the discretion of the instructor.

**Assignments & Grading:**

- To motivate you to do the reading prior to class and to get you thinking about the topic, there will be **quizzes** throughout the semester (in class) ; quizzes will cover readings & lecture material for the week.
- Multiple writing **assignments** will be assignment throughout the semester. Each report will cover class research projects.; due dates are listed below (but are subject to change, please keep updated on Canvas) and in the excel assignment table. Detailed instructions for each assignment will be provided on Canvas. Instructions will be provided on Canvas.
- One **exam** will be provided towards the end of the semester. This exam will cover class readings, in-class discussion and presentations and research projects.

**Points and Final Grade (may be adjusted slightly during semester):**

| **Points** | **% of Total** |
|---|---|
| Quizzes (7) | |
| 35 pts. | 23% overall |
| Assignments (4) | |
| 37 pts. | 24.5% overall |
| Exam (2) | |
| 37 pts. | |

24.5% overall
Reports (2)

42 pts.

28% overall

Total

151 pts.

100%

Letter grades will be assigned according to the following scale.

| Letter Grade | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- |
|---|---|---|---|---|---|---|---|---|---|---|---|
| % | 93-100 | 90-92 | 87-89 | 83-86 | 80-82 | 77-79 | 73-76 | 70-72 | 67-69 | 63-66 | 60-62 |

Information on the UF grading policy for assigning grade points can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

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**Spring 2019 – small adjustments may be made pending visiting speakers and out-of-classroom, on-campus field trips – To be changed for Spring 2020**

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| Week<br>Date | Lecture Topics | Readings for date of class<br>(see Canvas for .pdfs or links to readings) | |
|---|---|---|---|
| | **Organisms** | | |
| **1**<br>Jan. 8 | **Lecture Topics** : Course Introduction, IPCC, and climate change assessments<br><br>**Learning Objectives** : Obtain overview of current knowledge of climate change and how to assess organism vulnerability to climate change | *What is science? Owell versus Wells*<br>*(click above link)*<br><br>*Williams et al. 2010 An integrated framework*<br><br>***Optional reading:***<br>*IPCC 2014 (synthesis report)* | *Rec* |
| **Jan.** | **Discussion** | **Discussion** | *Pre* |

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| **10** | | | |
| **2**<br><br>Jan. 15 | **ecture Topics** : Climate change impacts on species morphology (color)<br><br>**earning Objectives** : Discover how climate change interacts with species morphology traits (size, color, shape). | *Zeuss et al. 2013 on butterfly melanism*<br>*Pistone et al. 2014 Albedo and darkening of the Arctic*<br><br>***Optional reading:***<br>*Weins 1989* | *Scale* |
| **Jan. 17** | **n-campus field trip** ***- Visit to Butterfly Rainforest and McGuire Center*** | ***Butterfly Rainforest*** | ***Est*** |
| **3**<br><br>Jan. 22 | **ecture Topics** : Climate change impacts on behavior and thermoregulation<br><br>**earning Objectives** : Appreciate the complexity of climate change impacts | *Laloe et al. 2014 Rising temperatures and sea turtle rookeries*<br><br>*Jensen et al 2018 Feminization of turtles*<br><br>***Optional reading:***<br>*Fan et al 2014 Cyclic color change and photoperiods*<br>*Sunday et al 2014 Thermal safety margins across latitude* | *Con*<br><br>*Copper*<br><br>C |
| **Jan. 24** | **n-campus field trip -Visit to FLMNH and collections** | *Sharma et al 2016 Monks record of climate change* | ***Establi*** |
| **4**<br><br>Jan. 29 | **ecture Topics** : Climate change impacts on physiology and genetics<br><br>**earning Objectives** : What is phenotypic plasticity and why is it important under climate change | *Geerts et al 2015 Rapid evolution in water flea*<br><br>***Optional reading:***<br>*Franks 2008 Rapid evolution in plants*<br>*Sunday et al 2014 on thermal tolerance* | *Rev*<br><br>C |
| **Jan. 31** | **ecture Topic:** Brown Anole ecology<br><br>**earning Objectives** : egin initial observations and construction of independent research on brown anoles | **On-campus field trip – Brown Anole** | ***Brown tempera*** |
| **5**<br><br>Feb. 5 | **ecture Topics** :<br>rown Anole survey Overview<br><br>**earning Objectives** : Develop a better understanding of the basis for species distribution models | *Kolbe et al 2014 Brown anole minimum and maximum tolerable temperatures* | *Guidanc*<br><br>*List of* |

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| **Feb 7.** | **n-campus field trip**<br>**'isit to Harn Art Museum**<br>**and art collections** | **On-campus field trip** | ***Es*** |
| | **pecies and Populations** | | |
| **6**<br><br>Feb. 12 | **ecture Topics** : Climate change impacts on morphology (shape)<br><br>**earning Objectives** : Appreciate the link between phenotypic plasticity and climate change | *Gils et al 2016 Red knot fitness and climate change*<br><br>***Optional reading:***<br>*Agrawal 2001 Evolution and phenotypic plasticity* | *Review* |
| **Feb 14.** | Guest lecture by Leslie Thiele of University of Florida | | ***Envi*** |
| **7**<br><br>Feb. 19 | **ecture Topics** : Rethinking population-level conservation under climate change<br><br>**earning Objectives** : Critically think about traditional conservation science and how it might change in the future | *Phillips, Weeks, and Hoffman on genetic diversity (click link above)*<br><br>*Georgina Mace's "Who's conservation"* | *W*<br><br>*Do we*<br><br>*Speci manage and in t* |
| **Feb 21.** | uest lecture by Dr. Matt Luskin of Nanyang Technological University | | *Clim* |
| **8**<br><br>Feb. 26 | **ecture Topics** : Climate change impacts on phenology<br><br>**earning Objectives** : Seasonal shifts in life-history traits in animals | *Mayor et al 2017 Bird and plant phenology in North America*<br><br>***Optional reading:*** *Gunderson and Leal 2012 Geographic variation in anole activity patterns* | |
| **Feb 28.** | **uest Lecture – Rebecca Senior** | | |
| **9**<br><br>Mar. 5 | **pring Break** | **Spring Break** | |
| **Mar. 7** | **Spring Break** | **Spring Break** | |
| **10** | **Lecture Topics**: Climate | *Angert et al 2008 Ouaternary climate change and* | |

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| **10**<br><br>Mar. 12 | **ecture Topics** : Climate change in space and time<br><br>**earning Objectives** : The importance of both historical and current climate in shaping species distributions | *Araújo et al 2008 Quaternary climate change and frog diversity*<br><br>***Optional reading:***<br>*Sandel et al 2011 Climate change velocity and endemism*<br><br>*De Frenne et al 2013 Microclimate moderates macroclimate warming*<br><br>*Scheffers et al 2017 Dispersal and arboreality* | *Disc* |
| Mar. 14 | **iscussion** | ***Discussion*** | |
| 11<br><br>Mar. 19 | **ecture Topics** : Species redistribution: what is a native species under climate change?<br><br>**earning Objectives** : To what extent are species changing their distributions to climate change and does this change our traditional view of conservation | *Freeman and Freeman 2014 Bird range shifts in PNG*<br><br>*Chen et al 2011 Global analysis of distribution shifts in animals*<br><br>***Optional reading:***<br>*Poloczanska et al 2016 Marine fish distribution shifts in response to climate change* | *Persor*<br><br>*Addres* |
| **Mar. 21** | **iscussion** | ***Discussion*** | |
| **12**<br><br>Mar. 26 | **ecture Topics** : Synergistic effects of climate change and habitat loss<br><br>**earning Objectives** : Climate change, habitat fragmentation and other disturbances are interacting with amplified impacts on species<br><br>- | *Frishkoff et al 2016 on habitat conversation and climate change favoring the same species*<br><br>*Group readings for puzzle:*<br>*1. Raffel et al 2015 Proc B*<br>*2. Puschendorf et al 2011 Cons Bio*<br>*3. Scheffers et al 2014 GCB*<br>*4. Greenspan et al 2017 Sci Reports*<br><br>***Optional reading:***<br><br>*Kerr et al 2015 Climate change impacts on bumblebees* | |
| **Mar. 28** | **iscussion** | ***Discussion*** | |
| | **teractions Among Organisms** | | |
| **13**<br><br>Apr. 2 | **ecture Topics** : Community assembly/disassembly under climate change<br><br>**earning Objectives** : The scale at which communities are re-distributing in response to climate change | *Verges et al 2014 Tropicalization of temperate zones*<br><br>*Hunting urban coyotes*<br>*(click above link)*<br><br>***Optional reading:***<br>*Fossheim et al 2015 Borealization of tundra zones* | |
| **Apr. 4** | **Discussion** | ***Discussion*** | |
| **14**<br><br>Apr. 9 | **ecture Topics** : Competitive interactions under climate change<br><br>**earning Objectives** : | *Stuart et al 2014 on rapid evolution in response to invasion*<br><br>***Optional reading:***<br>*Gifford and Kozak 2012 Islands in the sky/squeezed at the top* | *Revisiti*<br><br>*Stude* |

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| **Apr. 11** | **iscussion** | ***Discussion*** | |
| **15**<br><br>Apr. 16 | **ecture Topics** :<br>Phase/Regime shifts under climate change<br><br>**earning Objectives** : | *Wernberg et al 2016 Phase/Regime shift in marine kelp forests*<br><br>***Optional reading:***<br>*Bennett et al 2015 Tropical herbivores provide resilience against climate change* | *Parmes*<br>*(Figure*<br>*and ic*<br><br>*Stude* |
| **Apr. 18** | **iscussion** | ***Discussion*** | |
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**Attendance and Make-Up Work**

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

**Classroom demeanor and Professional conduct:** This class will be conducted in an atmosphere of mutual respect and your active participation in class discussions is encouraged. Strongly differing opinions are encouraged and welcome. The orderly questioning of the ideas of others, including mine, is similarly welcome. You should expect that if your conduct during class discussions seriously disrupts the atmosphere of mutual respect I expect in this class, you will not be permitted to participate further.

**Electronic Device Policy:** Students are permitted to use computers during class for note-taking and other class-related work only. Those using computers during class for work not related to that class must leave the classroom for the remainder of the class period. The use of cell phones, smart phones, or other mobile communication devices is disruptive, and is therefore prohibited during class. Except in emergencies, those using such devices must leave the classroom for the remainder of the class period.

**Academic Honesty:** Students are expected to become familiar with and follow current University Policy (see http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/ ). On all work submitted for credit by students at the university, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office (Source: 2013-2014 Undergraduate Catalog). It is assumed all work will be completed independently unless the assignment is defined as a group project , in writing by the instructor.

**Plagiarism:** As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writing etc., which belong to another. In accordance with this definition: THE STUDENT IS COMMITTING PLAGIARISM IF HE OR SHE COPIES THE WORK OF ANOTHER PERSON AND TURNS IT IN AS HIS OR HER OWN, EVEN IF PERMISSION BY THAT PERSON HAS BEEN GRANTED. Plagiarism will not be tolerated in this course. Offenders of this policy will be punished according to University policies. In addition, there will be no cheating of any type tolerated in this course. This policy will be vigorously upheld at all times in this course.
http://web.uflib.ufl.edu/msl/07b/studentplagiarism.htm l ,
http://flexible.dce.ufl.edu/Data/Sites/39/media/uf-policy_student-conduct1.pdf

**Software Use**
All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

**Campus Helping Resources**
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to use the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. University Counseling & Wellness Center, 3190 Radio Road, 352.392.1575, www.counseling.ufl.edu/cwc/ . Resources are also available on campus for students lacking clear career or academic goals, which interfere with their academic performance. Career Resource Center, First Floor JWRU, 352. 392.1601, www.crc.ufl.edu .

**Students with Disabilities:**
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Room 001 Reid Hall, 352.392.8565, www.dso.ufl.edu/drc/ .

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

**Course evaluation:** Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via

https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at: https://gatorevals.aa.ufl.edu/public-results/.

**Academic Resources Available:**
E-learning technical support, 352-392-4357 (select opti on 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml .

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. https://career.ufl.edu/

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/

Student Complaints On-Campus: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/

On-Line Students Complaints: http://distance.ufl.edu/student-complaint-process/

**Extended outline of Course**
*The Ecology of Climate Change* (WIS4934-1410) is a course primarily focused on climate change science but also relates underlying processes and impacts of climate change to other dominant conservation fields such as habitat fragmentation, invasive species, and urbanization. The course covers in detail ecological principles and theory and uses activities and discussion, with an emphasis on the scientific process (observation, questions, data collection, analysis, and critique), as a means to better understand climate change science.

The course is designed around an integrative framework for assessing species vulnerability to climate change. The framework balances intrinsic (species sensitivity) versus extrinsic (exposure) factors. Intrinsic factors center around the ecology, physiology and genetic diversity of a species, which influences adaptive capacity and resilience to climate change whereas extrinsic factors center around species exposure to microhabitat/topographic buffering of climate as well as regional climatic change.

At the beginning of the semester each student will execute an exercise, without any knowledge of the framework or readings for support, to construct their own framework (based on their current knowledge of ecology and common sense) for assessing species vulnerability for their chosen taxa. This framework will serve as the reference point for each student moving forward throughout the semester and will be adapted as knowledge is acquired.

We will then build on this understanding of the key components of the framework with a series of papers on observed impacts of climate change ranging from genetic diversity, phenotypic variation (morphology and physiology), phenology, distributions, population dynamics, community interactions, and ecosystem phase shifts. Students will also learn about general issues relating to scaling (both time and space) in ecology, biodiversity and climate gradients, thermal optimization curves, and species distribution and occupancy models, all of which are important concepts that support climate change science.

The short research activities are designed to help students integrate the theory they learned from academic articles into real-life scientific discovery. Importantly, by the end of each activity, students will have researched the key criteria of intrinsic and extrinsic factors from the integrated framework required for assessing species responses to climate change. At the beginning of each activity, students will form groups and each student group will plan and execute a small research project. There were 2-3 projects all tackling different sets of questions ranging from physiological tolerance to temperature, activity patterns within forest and urban environments as they relate to ambient versus operative temperature, and morphological traits that interact with climate. Throughout the course, students will peer-review each other's projects and provided constructive feedback for improvement.

The Ecology of Climate Change

Dr. Scheffers and I discussed the title, both before and after the consults from other departments. Brett's course covers climate change impacts beyond wildlife ecology and physiology. It includes those areas, but also how climate change will affect ecological processes from gene to ecosystem levels. He believes, and I support him, that the current proposed title is the most appropriate and will be able to clearly attract students. He may provide additional background.

Cheers,

ECH

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Eric C Hellgren
Professor and Chair
Department of Wildlife Ecology and Conservation
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, FL 32611
Ph. 352-846-0552
https://wec.ifas.ufl.edu/

# FW: Course Consult - The Ecology of Climate Change

Hellgren,Eric C

Thu 7/25/2019 4:55 PM

To:Scheffers,Brett <brett.scheffers@ufl.edu>;

Brett:

See consult from the Department of Geological Sciences. Upload this email to the Academic Approval website when you start the process (https://approval.ufl.edu/). I am waiting on Biology, which may be a while.

Cheers,

ECH

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**From:** Foster,David A <dafoster@ufl.edu>
**Sent:** Thursday, July 25, 2019 4:37 PM
**To:** Hellgren,Eric C <hellgren@ufl.edu>
**Cc:** Foster,David A <dafoster@ufl.edu>
**Subject:** Re: Course Consult - The Ecology of Climate Change

Hi Eric,

The undergraduate committee in the Department of Geological Sciences has reviewed the course proposal and sees no conflict with the climate change courses that we offer. I think the course will be highly complementary to what we offer.

Regards,
David

David A. Foster
Professor and Chair
Department of Geological Sciences
PO Box 112120
University of Florida
Gainesville, FL 32611

Dept. office: 3523922231

On Jul 17, 2019, at 9:07 AM, Hellgren,Eric C <hellgren@ufl.edu> wrote:

Hi David:

WEC is requesting approval for a new upper-division undergraduate course taught by Brett Scheffers: The Ecology of Climate Change. It has been taught under special topics number WIS 4934 since spring 2017, and covers how climate change affects ecological responses of organisms.

I have attached the syllabi and the UCC consult form for the consideration of the Department of Geological Sciences. Ellen Martin and Andrew Zimmerman would be appropriate reviewers.

Thank you!

Cheers,

ECH

Eric C Hellgren
Professor and Chair
Department of Wildlife Ecology and Conservation
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, FL 32611
Ph. 352-846-0552
http://wec.ufl.edu/

<uccconsult.pdf><Syllabus_WIS 4934_The Ecology of Climate_Change_2019_FINAL.docx>

# FW: followup: consult

Hellgren,Eric C

Tue 8/13/2019 10:07 AM

To:Scheffers,Brett <brett.scheffers@ufl.edu>;

Brett:

See consult from Marta Wayne, Chair of Biology. Please include this email in your course request process. I think your current title is fine as is.

Cheers,

ECH

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**From:** Wayne,Marta L <mlwayne@ufl.edu>
**Sent:** Thursday, August 1, 2019 2:52 PM
**To:** Hellgren,Eric C <hellgren@ufl.edu>
**Subject:** followup: consult

Dear Eric,

Apologies, I have been traveling. My faculty have replied that there is not currently a lot of overlap between our relevant courses (BSC3307, Climate Change Biology; and BSC2862, Global Ecology and Sustainability) and your proposed offering. In order to make the courses obviously different to the students, we would like to ask if you all might be willing to use a course title and catalog description that is more focused on how climate change affects wildlife ecology and physiology (which seems to be what most of the course is about). Our courses are more about carbon cycling and Earth systems. For example, the WEC course title could be something like "Climate change impacts on wildlife". If we've misconstrued the course and that's a crazy title, or I have misunderstood something else, just let me know.

Yours from the UK (back Monday)
Marta