

Teaching Psychology and Climate Change: One Way to Meet the Call for Action

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Abstract

In the past several years, the American Psychological Association (APA) has called for psychologists to become more involved in addressing climate change. One way to address this crucial issue is through curriculum. To this end, we describe an undergraduate course that we created and teach exclusively focused on the interface of psychology and global climate change. The course is a seminar structured around three broad themes: science and impacts, adaptation, and solutions. To support others developing curriculum in this area, we explain these themes and share the course organization and structure, along with our experiences in teaching it. We provide relevant examples of activities and resources in the context of the goals and outcomes of APA's Guidelines for the Undergraduate Psychology Major. We further discuss considerations of competence and interdisciplinarity in teaching on this issue. Finally, given the magnitude and significance of climate change, we consider experiential aspects of students in the course related to stress.

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In 2011 the American Psychological Association (APA) outlined a central role for psychology in addressing climate change through its Task Force on the Interface between Psychology and Global Climate Change (Special issue: psychology and global climate change, 2011), underscoring the ethical imperative to take action on this urgent problem (Doherty & Clayton, 2011; Swim et al., 2011). This call for action parallels the scientific consensus on the role of human activity in the cause of climate change (Cook et al., 2016) and the growing appreciation of the psychological impacts of it (Clayton, Manning, & Hodge, 2014). Accordingly, the psychology literature shows a steep increase in the number of publications annually that address climate change in some way, from almost none in year 2000 to over 250 in 2015¹.

College students on our campus increasingly believe that climate change is occurring,² and that climate change will impact human civilization in some way.³ Despite these general trends showing growth in the appreciation of climate change, in our experience, most students and faculty in psychology are still initially unclear about how the discipline relates to the problem. In reality, psychology as a field holds great potential for gaining insight to how people understand, are affected by, and are engaged in addressing climate change (Swim, Stern, et al., 2011). Psychology may also greatly facilitate solutions to climate change when integrated with other social and natural sciences (Gifford, Kormos, & McIntyre, 2011). As a pervasive problem facing humanity, students arguably need exposure to this topic in the psychology curriculum⁴ to gain a well-rounded education that prepares them for a career, and life in general. Accordingly, coursework in this topic area allows instructors to address many of the goals and outcomes of APA's Guidelines for the Undergraduate Psychology Major (American Psychological Association, 2016) - many of which ultimately support the prevention and amelioration of human problems.

Despite the growing attention to climate change and the need for psychology students to understand how their field relates to it, few if any undergraduate courses are dedicated exclusively to the topic. Current psychology textbooks and courses often include climate change along with a range of other environmental issues from perspectives such as environmental psychology, psychology of sustainability, and ecopsychology (e.g., Gifford, 2014; Scott, Amel, Koger, & Manning, 2016). Here we describe what may be one of the first undergraduate psychology courses devoted entirely to climate change. We have developed and taught variations of the basic course, *Psychology and Global Climate Change*, three times since 2013. Rather than prescriptive, we seek to share our experiences to support others in addressing climate change as they see fit through their courses.

Course Format and Structure

Our course is generally taught as an upper-level, discussion based seminar, enrolling psychology majors and students from other majors with an interest in climate change (e.g., Environmental Studies). On the first day, we begin by outlining the class policies and structure of the course. We then use a brief writing activity followed by discussion. Prompts include: "What are your thoughts about climate change? What is it, and what does it mean for you and the world in general? What questions do you have about this topic? What goals do you have for learning in this course? What place does psychology have with the topic of climate change?" The discussion centers on these questions and also includes consideration of the emotional impact the topic might have on students, with mention of the Student Counseling Center resources that are available.

Following discussion, students again write for the last 10 minutes of class, considering their initial responses, and how their thinking has evolved as a result of the discussion. Prior to the next class, we ask students to consider taking an on-line survey we designed to assess beliefs, perceived knowledge, and stress related to climate change. This survey is completed at the beginning, midpoint, and end of the course, for use both in class discussion, and for outside publications and presentations as approved by our institutional review board (IRB).

Because some students may be uninformed or uncertain about what they believe with regard to the reality of climate change, the second class begins with discussing the premise that, based on current evidence (Cook, et al., 2016), climate change is happening and human activity is playing a significant role. We explain that this is an assumption for the course much like other courses, such as in statistics and other topical areas, may outline the theoretical or logical assumptions that they are built on. We present evidence in support of this assumption early in the course, and avoid the quagmire of non-scientific debate sometimes conveyed in the media.

At the start of each class, students have the opportunity to present on current events or information they have recently encountered on climate change for class discussion. Though we sometimes limit the time dedicated to this, we find that the resulting discussion often leads to a natural stepping off point into the topic of the day. The daily discussion topic and/or lesson follows from an assigned reading/activity and an accompanying journal entry. During class time, some interactive lecture is used, mostly to provide a conceptual platform of basic psychological theory that is applied to climate change through subsequent discussion. Discussions are fluid within a topical framework, drawing on student perspectives in conjunction with theory and material assigned or presented by the instructors. We utilize multiple resources, including videos and guest speakers to access the various topics at hand.

In addition to these in-class activities, students have the opportunity to take advantage of several outside experiences

¹ Search on *Ebsco PsycINFO*, August 5, 2016 using terms: DE Subjects (Exact) = climate change OR global warming.

² Based on select introductory psychology classes at our institution: 620 students from consecutive classroom samples across seven semesters responded to the "clicker" poll prompt "I believe that a meaningful degree of climate change is happening in the world." Responses grew incrementally from 66% selecting "yes" in 2012 to 90% selecting "yes" in 2016. Though a convenience sample, this course enrolls a diverse cross-section of majors spanning the university, suggesting that students on our campus are increasingly aware of climate change as a reality.

³ Based on responses [$M = 4.5$ ($SD = 1.4$), scale: 0 (not at all) to 6 (very much)] to the question, "To what extent do you think climate change will impact (broadly defined) human civilization?" from a campus internet survey conducted by our psychology and climate change class in the fall of 2014 with 713 responses [77% women; 76% White; age 18-30 years, $M = 20.6$, $SD = 2.2$] out of 8,970 students contacted via campus email.

⁴ Curricula in this topic area could include focused research experiences, specialized courses taught to psychology majors, and the incorporation of climate change into other courses in psychology and other disciplines.

PSYCHOLOGY AND CLIMATE CHANGE

described under Assignments and Activities. Throughout the semester, students work on papers that are due at the end of the semester. To share what they have learned with others, they give an oral presentation of their research to the class, or present it as a poster in an open campus session.

Themes and Topics

The semester is broken into three overarching themes: science and impacts, adaptation, and solutions. We believe that this order of presentation helps build both a hierarchical understanding of the topic, and empowerment - an issue we address later in terms of stress appraisal associated with climate change. We have used as a core text, a special issue of the *American Psychologist* reporting on the APA's Task Force on the Interface between Psychology and Global Climate Change (Special issue: psychology and global climate change, 2011). Therefore, much of the course approaches climate change from an integrated environmental stress model (Reser & Swim, 2011). While this structure has worked well for us, we acknowledge that there are many ways to build a course as far reaching as one on psychology and climate change. In addition, there are many ways that psychological concepts and theories have been applied to environmental sustainability in general (Gifford, 2014; Koger & Scott, 2016; Scott, et al., 2016) that instructors can draw upon. Specific to our course, Table 1 provides examples of supporting topics, activities, and resources applied specifically to climate change that instructors may consider for each theme. We note, however, that the quickly changing nature of the field also requires constant updating of the content, sometimes even between class meetings as key research and events related to climate change unfold.

The topics and themes for the course provide students with an opportunity to meet the goals and outcomes of APA's Guidelines for the Undergraduate Psychology Major (American Psychological Association, 2016)⁵. For example, the first APA Goal of building a general knowledge base in psychology can be met in this course through outcome 1.1 (Describe key concepts, principles, and overarching themes in psychology), reflected by learning and applying basic theory on attitudes, stress, attitude change, and behavior change. More unique to this course relates to outcome 1.3 (Describe applications of psychology) through learning the relevance of various domains of psychology (e.g. clinical psychology and social psychology) and other social sciences (e.g., economics, public health) to climate change. Likewise, for Goal 3 (Ethical and Social Responsibility in a Diverse World), an indicator of meeting outcome 3.3 (Adopt values that build community at local, national, and global levels) may be evidenced in student learning about sense of place and importance of community in understanding climate change impacts and environmental stewardship, or recognizing how climate change is an issue of social justice, both locally and globally. Instructors could elect to assess these indicators through traditional pre-post objective (e.g., multiple choice) assessments or by using open-ended formats such as specific journal entries assigned early and late in the semester that provide a window for growth assessment on various indicators.

Science and Impacts

The first third of the course is devoted to gaining a basic understanding of the science and impacts of climate change

at global and local levels. Although our course enrolls students from a variety of disciplines, we typically have mostly psychology majors. Because of this, many of our students lack a solid understanding of the physical science behind climate change and the impacts that climate change may have on our planet and society. To bring everyone to the same basic level of understanding, the first two or three class periods are spent providing the basic facts and science of the phenomenon as well as dispelling many misconceptions of what climate change is and is not (e.g., many students believe global warming is caused by a hole in the ozone layer of the atmosphere). There are myriad online and print materials from reputable sources that present the basic physical science behind climate change in a clear and concise manner (see Table 1). It is prudent for instructors to vet these resources through an expert in that content area, such as a qualified colleague from a geography or geosciences department. Such individuals may also be willing to attend class as a guest lecturer to present on this aspect of the topic.

Following the physical science, we cover the psychological science on beliefs and attitudes about climate change. For example, we examine the basis through which people may hold diverse beliefs on the issue, and the durability of these beliefs, in a discussion of vertical and horizontal belief structures. We also discuss the "Six Americas" identified by Leiserowitz and colleagues that characterize segments of the population as "alarmed," "concerned," "cautious," "disengaged," "doubtful," or "dismissive" about climate change (Leiserowitz, Maibach, & Roser-Renouf, 2009). On this topic we discuss results from our course survey in which we assessed this construct at the beginning of the semester (see Table 1). Also in discussing beliefs and attitudes, we critically examine the online comment section of a national survey on climate change (see Table 1). This activity naturally brings in the affective component of attitudes, and nicely segues to politics and ideology as the final topics of this section.

Adaptation

This part of the course begins with brief coverage of deep history in order to provide context for students in appreciating how humans have evolved in the face of changing climatic conditions over time. For this, it may be useful to invite expert colleagues on history, anthropology, or geography to class for discussion or lecture. We find this context helpful at this point in the course when some students may be overwhelmed with a sense of hopelessness about our current situation. The historic perspective encourages a balanced discussion about the adaptability of the human race and the challenges it now faces in terms of population size. We then turn to a range of adaptations to climate change that may be necessary based on current assessments, such as from the Intergovernmental Panel on Climate Change (IPCC, see Table 1). Other topics within the adaptation theme pertain to the direct and indirect psychological impacts of a changing climate. This includes both acute stress reactions to climate-related events (e.g., storms, droughts, etc.) as well as more subtle experiences of stress associated with the chronic, pervasive nature of gradual climatic changes (Clayton, et al., 2014; Doherty & Clayton, 2011). Included in this part of the course is a discussion of displacement and the related concepts of place attachment and sense of place. We also examine mental health concepts related to hopelessness and depression; conversely, we discuss psychological resilience and mindfulness

⁵ A complete table outlining the goals and outcomes with examples of indicators is available from the first author.

PSYCHOLOGY AND CLIMATE CHANGE

as valuable constructs in coping with the reality of climate change.

Solutions

In the third section of the course, we focus on various solutions to the problem of climate change, with an emphasis on human contributions through greenhouse gas emissions. This spans various technological, economic, governmental, and behavioral factors. We focus primarily on attitudes and behavior change, applying established theory in these areas to the problem. Although there is some literature that directly applies behavioral theory to climate change (e.g., Gifford, et al., 2011), the existing literature on behavior change and environment more generally (e.g., energy conservation) can also be drawn upon and easily applied to the issue. We end this section by considering the ethics surrounding the power that psychology holds; we discuss the ethics of using psychological theory and techniques to change individual and societal behavior, as well as what the appropriate role of psychological scientists is in studying versus advocating for issues of social importance like climate change. This discussion effectively illustrates the complexity of ethical issues for students, and how they may be approached by psychologists.

Assignments and Activities

As a seminar, we do not use tests or quizzes, but grade students on class preparation (25%), class participation (25%), outside activities (25%), and a paper/presentation (25%).

Class preparation

Class preparation consists of daily reading assignment journal entries submitted on one typed page at the start of class. Students answer particular questions or make specific observations related to a reading or other assignment. For example, after reading van der Linden et al. (2015) they answer the following two questions: "1) Apply at least one of the principles/guidelines discussed by the authors to address the problem of climate change (e.g., how would you use this principle if you were a policy maker?); 2) Discuss the possible risks of going too far in applying this principle, such as, could it somehow circumvent people's freedom and right to individual choice? How do we balance that when applying the principle?" At the end of the class, students write freehand on the back of their journal pages integrating what they learned in class that day with their original response. Journal entries and in-class responses are graded (3 points for the front, 2 points for the back) and returned by the next class.

Class participation

Class participation is assessed based on the extent that students apply the concepts from the readings and substantively further class discussion. Participation also includes any current event related to climate change that a student shares and discusses at the beginning of class.

Outside Activities

Our university is situated close to sites where students can see the effects of climate change, such as sea level rise. For example, students take a field trip to a local island community

threatened by sea level rise, to witness firsthand the impact of climate change. Given the ubiquity of climate change impacts, we believe that there are opportunities to see these effects at the local level in most places that a course may be offered. Students also participate in CrossTalk, which is an informal lunchtime gathering of students, faculty, and staff from across the university to discuss environmental sustainability in all aspects of campus life. Sample themes by semester include: "Climate Change in the Curriculum", "CALLING ALL MAJORS: What do you want to Learn about Climate Change?", "Changing Climate, Changing World... Changing You? A Campus Discussion on Identity, Place, and Environment." Students act as the facilitator for one session and have the responsibility of guiding the group discussion based on prompts and questions developed with the class, relevant to the chosen theme. The grade for outside activities is based on reflection papers that students write integrating their various experiences with concepts from the course.

Paper

Students select a paper topic from a list of options we provide. The following two examples represent the range of topics: 1) Determine your carbon footprint and discuss how you can reduce it. Apply psychological principles that we have learned about in the course; 2) A number of people are running for the nomination of their party for the Presidential election. Select one of the people from each party. Explain what each proposes about climate change. Critique each of the proposals using relevant sources. Then explain how each of their positions relates to the material discussed during the semester, such as the elaboration likelihood model of persuasion. To help ensure quality papers, students submit a proposal by mid-semester, followed by a detailed research log describing the sources and methods they will use in their paper, and a final paper due at the end of the semester. One semester, we alternatively had students create and present a poster (at a session open to the campus) that portrayed various ways that the topic of climate change related to their major area of study, consistent with the theme of CrossTalk that semester.

Student Experiences

Climate change is one of the most pressing issues that humanity will face for generations. Most students are initially unaware of the problem's scope and the implications of it. Given the significance of climate change, there is a growing appreciation that there may be stress associated with exposure to information about it (Dodgen, et al., 2016). However, we are not aware of any published research examining how learning about climate change in the classroom impacts emotional health. Survey data from our campus⁶ suggests that many students either do not think there will be an emotional impact, or they are not sure how learning about the topic may impact them. Given what we have observed to be a general lack of understanding among students about climate change and its implications for society, along with the potential for stress from increased awareness of climate change, we believe that it is important for instructors to be attuned to student's experiences as they learn about the issue,

⁶ Across 595 responses to a survey emailed to our student body in the fall of 2014, students responded to the following question: *What do you think the emotional impact would be for most students if there were increased exposure to climate change topics in their regular college courses across all majors? [scale: 0 (very negative) to 6 (very positive)].* The mean

response was near the midpoint of the scale ($M = 3.27$ ($SD = 1.37$, range = 0 - 6)). This finding is consistent with survey results at the start of each of our three psychology and climate change courses ($N=23$) where the mean response to this question was also at the midpoint ($M = 5.35$, $SD = 1.61$, range = 1 - 9) on a scale of 1 (very negative) to 9 (very positive).

and to use class discussion as a means for students to share and normalize their experiences as needed.

Though students may experience distress in other coursework, we have found this topic, particularly in a discussion-based format, to more clearly elicit expressions of distress and hopelessness among students more than for other courses we have taught. In addition, some students convey a substantial amount of stress about climate change in their journal entries, but not in class discussions. This underscores the value of using a number of methods to assess stress among the students. Using “side 2” of the student journals provides instructors with the opportunity keep their finger on the pulse of the class in terms of stress reactions. At times, we explicitly ask students to write about their experience so far in the course, and to discuss any related concerns they might have; indeed, following these assignments we have adjusted subsequent class discussions to address reports of stress.

In doing so, we were mindful of the distinction between appropriately addressing student concerns through class discussion and the unwitting facilitation of group therapy in the classroom. For instructors without training to recognize and handle such mental health issues and boundaries in the classroom, it may be important to consult with colleagues who are competent in this area prior to the course starting, and as needed throughout. At minimum, when discussions are particularly relevant to stress or mental health, or if a student exhibits a potential need, instructors should be prepared to provide information about mental health resources on campus – as to not single out anyone in particular, we typically provide such information to all students during class time, and address any concerns with individual students afterward.

In addition to class discussion, the order and nature of topics covered can help address student distress. We find that students tend to verbalize the most distress by mid-semester, having learned about the impacts, adaptations, and uncertainties related to climate change. For example, students often make statements like, “this seems like a hopeless situation, so what can we do about it?” For the adaptation theme, we discuss constructs related to resilience, including mindfulness, as one potential approach to managing uncomfortable thoughts and emotions that they may experience about climate change. Although we do not focus on other stress management skills in the classroom, general resilience and stress management skill building have been used in the undergraduate classroom (Shatkin, et al., 2016) and may be useful additions to a course on climate change, perhaps with a particular focus on stress related to that problem. Finally, we believe that covering a range of solutions to address climate change is empowering for students. For example, we cover mitigation by applying principles of behavioral and social change. Included in this are options for personal action and change that students generally report to be fulfilling. Although our emphasis on this has come in the last portion of the course, it may be beneficial for instructors to integrate this content throughout the course along with perhaps service learning, volunteering, or other personally empowering activities as a buffer to the stress of the topic.

To supplement our qualitative approach to monitoring the student’s experience, we have assessed a range of learning outcomes and stress-related experiences of students, through IRB-approved web surveys of student perceptions of learning and stress during the semester. This not only allows for an additional measure of student progress and experience, but we use some of the aggregated responses to illustrate concepts, for example, related to stress when covering that topic in class. Although our

surveys were not designed to assess APA learning goals, the psychology literature could benefit from efforts to do so in future courses. Table 2 provides a cursory look at aggregated data from select questions assessed at the beginning and the end of the semester. These data suggest that, over the course of the semester, students significantly increased in their belief that climate change is happening and in their self-reported understanding of the causes and consequences of it. They also demonstrated significantly increased perceived relevance of psychology to climate change, and efficacy in addressing the problem (all p values $\leq .007$). Although stress does not appear to change significantly between the beginning and end of the semester, students overall report a moderate amount of stress about climate change (see Table 2). We wish to note that this average rating includes a range of responses from “not at all stressful” to “extremely stressful,” which further underscores the need to be aware of the student’s individual emotional experience during the course as noted previously.

Competence and Interdisciplinarity

Although the discipline of psychology has much to offer in addressing climate change, and arguably has an ethical imperative to do so (Doherty & Clayton, 2011; Swim, Stern, et al., 2011), we need to be mindful of the limits regarding professional competence when applying theory to relatively novel and emerging phenomena (Swim, Stern, et al., 2011). As individual psychologists, and as a discipline, this requires thoughtfulness on the balance between our competence in basic theory, and a degree of measured creativity and boldness to explore applications of theory to an area that is only beginning to accumulate research.

Consistent with the general place of psychology as a “hub science” (Cacioppo, 2013), our discipline has a great deal of perspective to offer in addressing climate change. Although the issue provides an excellent opportunity for application of psychological literature and knowledge of human behavior, the full problem of climate change transcends disciplines. This suggests that an interdisciplinary or transdisciplinary approach (Choi & Pak, 2006) may be ideal in teaching the topic. Collaborating with experts outside of psychology may be particularly helpful because most psychologists are not trained or perhaps even familiar with the basic science of climate change, or the implications of it for society.

One way to address competence across disciplines is through inviting topical experts as guest speakers to class. For example, we have had an atmospheric scientist present about basic concepts of climate and climate change. In addition, we have expert colleagues review or suggest materials we use in class, for example, on the basic science of climate change or the history of human adaptation to climate.

Even within psychology, there are many areas of expertise that come to bear on the issue of climate change. One way we address competence within psychology is to co-teach the course with colleagues (the present authors) who have different areas of expertise across social and clinical psychology that we apply to the topic. Nevertheless, a generalist who has a sufficient level of knowledge about climate change could potentially, through thoughtful consultation with and supervision by appropriate expert colleagues, teach a course dedicated to the topic at the undergraduate level, or integrate climate change into other courses they teach.

Conclusion

Despite the call for psychologists to actively address climate change, and the rapidly growing psychology literature on the issue, there is currently a paucity of teaching on psychology and climate change. The rapidly evolving physical and social science of climate change, and the relevance across many sub-disciplines of psychology, requires an unusual amount of interdisciplinary effort and collaboration to address this void with competence. It is nevertheless important for students to understand how psychological principles interface with climate change so that they may help both determine and navigate a future that is increasingly uncertain in the face of a changing climate. Because the topics can be emotionally difficult for some students, instructors should design empowering content and experiences throughout the course, and be prepared to address student concerns. Finally, research is needed that assesses student outcomes for this type of course, both emotionally, and in terms of APA learning goals.

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Table 1

Course Themes and Topics

<u>Theme</u>	<u>Topics</u>	<u>Example Resources/Activities</u>
Science and Impacts	Physical Science Basis of Climate Change	<ul style="list-style-type: none"> Center for Climate and Energy Solutions (2011d) American Geophysical Union (2013) IPCC & government resources: <ul style="list-style-type: none"> IPCC Video overview of science & impacts (IPCC, 2013, November 21) IPCC report of science & impacts (IPCC, 2013) 2014 National Climate Assessment (U.S. Global Change Research Program, 2014) Climate Time Machine (interactive) (NASA Scientific Visualization Studio) Swim, Clayton, & Howard (2011) Experiment with & discuss various online “Carbon footprint” calculators; discuss assumptions & data sources
	How climate change is understood	<ul style="list-style-type: none"> Weber & Stern (2011)
	Historic perspectives & current public opinion on global warming & climate change	<ul style="list-style-type: none"> America’s First Great Global Warming Debate (Kendall, 2011) Global Warming's Six Americas (links to research report, measurement manual, and various online resources) (Leiserowitz, et al., 2009)
	Social cognition, attitudes, & influence; Beliefs and belief structures; Elaboration Likelihood Model; Theory of Planned Behavior	<ul style="list-style-type: none"> Class discussion of concepts and class survey results Create a scale with the class measuring climate change knowledge and beliefs (Bem, 1970) Analyze Pew Survey Climate Change comment thread (Pew Research Center, 2013) Roser-Renouf, Maibach, Leiserowitz, & Zhao (2014) Winerman (2014)
	Ideology & political factors	<ul style="list-style-type: none"> Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Rosenthal (2014) Share & discuss various current newspaper articles
Adaptation	General	<ul style="list-style-type: none"> Center for Climate and Energy Solutions (2011b)
	What human and societal adaptations are necessary?	<ul style="list-style-type: none"> IPCC Video overview of impacts, adaptation, & vulnerability (IPCC, 2014, March 30) Society and resilience (Swis Re, 2012, September 24) Doherty & Clayton (2011)

PSYCHOLOGY AND CLIMATE CHANGE

	General stress of environmental change	<ul style="list-style-type: none">• Dodgen et al. (2016)
	Displacement, place attachment & sense of place	<ul style="list-style-type: none">• Horwitz, Lindsay, & O'Connor (2001)• Discuss in terms of local impacts: Horton (1996); Harp (2011, September 6)
	Public health, Mental health, depression, & hopelessness	<ul style="list-style-type: none">• Doherty & Clayton (2011)• Reser & Swim (2011)• Discuss stress data from class survey
	Resilience	<ul style="list-style-type: none">• Discuss & relate to climate change: American Psychological Association (n.d.-b) American Psychological Association (n.d.-a)
	Mindfulness	<ul style="list-style-type: none">• In-class discussion & classroom interactive experience of mindfulness
Solutions	Overview of technological & business solutions	<ul style="list-style-type: none">• Center for Climate and Energy Solutions (Center for Climate and Energy Solutions, 2011e) (Center for Climate and Energy Solutions, 2011c)• NASA Earth Science Communications Team (n.d.)
	Role of society & governments	<ul style="list-style-type: none">• Climate Change 101Series (reports on international, federal, state, & local action) (Center for Climate and Energy Solutions, 2011a)• IPCC Video overview of Mitigation (IPCC, 2014, June 6)• IPCC report of Mitigation (IPCC, 2014)
	Communication, Social influence & behavior change; Applying social influence theory	<ul style="list-style-type: none">• Winerman (2014)• van der Linden, Maibach, & Leiserowitz (2015)• Stern (2011)• Gifford (2011)
	Applying behavior change theory to climate change	<ul style="list-style-type: none">• Gifford, Kormos, & McIntyre (2011)• Akerlof & Kennedy (2013)• Sleek (2013)
	Ethical considerations for psychologists	<ul style="list-style-type: none">• Discuss ethics of interventions to change attitudes & behavior• Akerlof & Kennedy (2013); Sleek (2013)• Scientist vs activist (Frank, 2014)

Note: IPCC = Intergovernmental Panel on Climate Change

PSYCHOLOGY AND CLIMATE CHANGE

Table 2

Class Survey Belief and Perception Data, Pre and Post Semester

Question	Pre	Post	t^a	Sig	Est. Cohen's d	r^2
Do you think climate change is or will soon be occurring?	7.91 (1.36) $N=46$	8.46 (1.00) $N=28$	2.94	.007	.55	.24
How well informed do you feel when it comes to understanding the causes of climate change?	5.02 (2.13) $N=46$	8.00 (.98) $N=28$	16.07	.000	3.04	.91
How well informed do you feel when it comes to understanding how society can begin adapting to the problem of climate change?	4.83 (2.15) $N=46$	7.00 (1.83) $N=28$	6.29	.000	1.19	.59
How well prepared do you feel to begin taking steps to reduce the effects of greenhouse gasses?	5.48 (2.20) $N=46$	7.04 (1.68) $N=27$	4.83	.000	.93	.47
How relevant is psychology in dealing with climate change?	6.58 (1.98) $N=12$	8.27 (.79) $N=11$	7.14	.000	2.14	.84
How confident do you feel in talking to others about the relevance of psychology to the issue of climate change?	4.00 (2.05) $N=12$	8.09 (1.04) $N=11$	12.99	.000	3.75	.94
Overall, how stressful do you find the issue of climate change to be?	2.54 (1.05) $N=46$	2.89 (.99) $N=28$	1.88	.071	.35	.12

Note: Question scale = 1 (not at all) to 9 (very much). The scale for the last item is: 1 = not at all stressful; 2 = slightly stressful; 3 = moderately stressful; 4 = considerably stressful; 5 = extremely stressful]. ^a t -tests were conducted as single sample t tests in which the pre semester mean was entered as the test value (μ) to which the post-semester mean was compared.

Ancillary material not appearing in final version of manuscript

Table: Course Content and APA Goals

<u>Goals and Outcomes</u>	<u>Indicators</u>
1: Knowledge Base in Psychology	
1.1 Describe key concepts, principles, and overarching themes in Psychology	Learn basic theory on attitudes, stress, attitude change, and behavior change; key psychological concepts relating to processes that influence adapting to and coping with climate change (Reser & Swim, 2011), and barriers to climate change mitigation and adaptation (Stern, 2011); the relevance of various domains of psychology (e.g. clinical psychology and social psychology) and other social sciences (e.g., economics, public health) to climate change.
1.2 Develop a working knowledge of psychology's content domains	Learn how multiple psychology sub-disciplines relate to the problem of climate change.
1.3 Describe applications of psychology	Apply social psychological concepts and theory regarding beliefs, attitudes, and behaviors; psychological principles to specific topics within climate change for final projects (e.g. paper, poster).
2: Scientific Inquiry and Critical Thinking	
2.1 Use scientific reasoning to interpret psychological phenomena	Students analyze their own belief structures with respect to climate change; beliefs of people who engage in anti-scientific thinking and deny the reality of climate change. Use of theory and class survey data; identify psychological explanations for various findings such as differences in the attitudes of Democrats, Republicans, and Independents toward climate change (Leiserowitz, et al., 2014).
2.2 Demonstrate psychology information literacy	Reflection activities provide an opportunity to summarize primary resources accurately; interpretation of graphs & statistical analyses to understand findings of various studies (e.g., Leiserowitz, et al. (2014)); use of class survey data (e.g., 6 Americas); access and utilize a variety of media for final projects (e.g., literature databases, official websites, & newspapers).
2.3 Engage in innovative and integrative thinking and problem solving	Participation in CrossTalk sessions which facilitated problem-solving discussions on climate change from various disciplinary perspectives; recognition that climate change is a novel problem that requires innovation and collaboration.
2.4 Interpret, design, and conduct basic psychological research	Interpret primary research reports for assignments and paper project; utilize scientific reasoning when discussing assigned research surveys (e.g., sampling bias); creation of a climate change attitude scale, including item development, data collection, and statistical analysis; option to collect, analyze, and report data for paper project.
2.5 Incorporate sociocultural factors in scientific inquiry	

PSYCHOLOGY AND CLIMATE CHANGE

Learn how climate change has differing impacts across the globe and demographic groups; read articles that discuss internal and external validity (Swim, Stern, et al., 2011).

3: Ethical and Social Responsibility in a Diverse World

3.1 Apply ethical standards to evaluate psychological science and practice

Learn about APA Ethics Codes and the role of the IRB when developing an attitudes scale, discussing final projects, and engaging in consent procedures to administer class surveys; learn about ethical issues pertaining to interventions to change attitudes & behavior; discuss the role of psychologists and others as scientists versus advocates for issues like climate change.

3.2 Build and enhance interpersonal relationships

Address respect and civility during the semester given different levels of knowledge, strength of opinions, and comfort in discussing climate change among students.

3.3 Adopt values that build community at local, national, and global levels

Learn about sense of place and importance of community in understanding climate change impacts and environmental stewardship; recognize that climate change is an issue of social justice, locally and globally; understand the ethical imperative for psychology to address the issue of climate change (Swim, Stern, et al., 2011).

4. Communication

4.1 Demonstrate effective writing for different purposes

Use of expository and persuasive writing styles, and APA format for final papers. Receipt of feedback on paper drafts.

4.2 Exhibit effective presentation skills for different purposes

Current events presented at the beginning of class and in final projects; use of visual support in poster presentations.

4.3 Interact effectively with others

Practice effective communication and listening skills in discussions with students of diverse backgrounds and viewpoints; interact effectively with other students and faculty from diverse disciplines when recruiting for and hosting the CrossTalk discussion series; extract key information and ask appropriate questions of invited speakers in the classroom and with community members from diverse backgrounds on field trips.

5. Professional Development

5.1 Apply psychological content and skills to career goals

Critically evaluate information encountered daily about climate change; increased awareness of the diversity of backgrounds and opinions on climate change, and how these and other individual and normative differences impact beliefs and attitudes. Apply relevant psychological concepts when engaging with speakers from diverse careers (e.g., National Park service, government, education, farming).

5.2 Exhibit self-efficacy and self-regulation;

Enhance self-efficacy on the issue of climate change by using psychological concepts to change the carbon footprint of oneself and others; understand strategies to change attitudes and behaviors of others related to climate change.

PSYCHOLOGY AND CLIMATE CHANGE

5.3 Refine project-management skills

Follow timeline for completing final projects: topic of project, proposed methods and resources, first draft of project; receive feedback on the viability of proposed methods at each stage of the project.

5.4 Enhance teamwork capacity

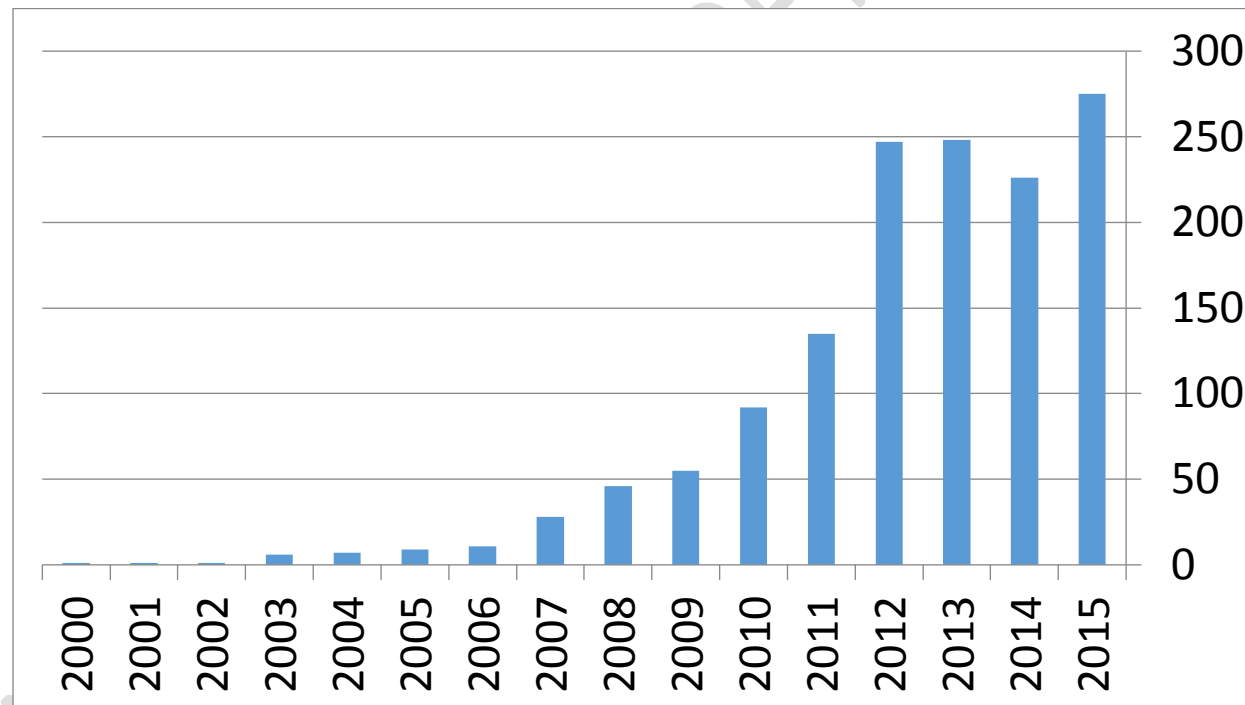
Learn how to have a collaborative, balanced discussion (e.g., listening skills, waiting for an opportunity to speak); work through conflicts with differing opinions and dominant students.

5.5 Development meaningful professional direction for life after graduation

Learn about psychology careers during discussion, particularly related to environmental issues, and how the interdisciplinary nature of the climate change affords novel career options.

Ancillary material not appearing in final version of manuscript

Figure: *Number of new Publications on Climate Change or Global Warming Indexed Annually on Ebsco's Psychology Literature Database, PsycINFO*



Note: Search on August 5, 2016 using terms: DE Subjects (Exact) = climate change OR global warming.