

# TOHONO O'ODHAM COMMUNITY COLLEGE



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## Syllabus: **BIO 154N: GLOBAL CHANGE BIOLOGY**

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### Course Information

Course Prefix/Number: Bio 154N	Credit Hours: 4 (3 lecture & 3 lab periods)
Semester: Fall 2017	Course Title: Global Change Biology
Class Days/Times: MW 9-11:15 plus one field trip and online work	Room: Gewkdag Son Ki Room 5

<b>Instructor Information:</b> Name: Teresa Newberry, Ph.D.	Phone/Voice Mail: 520-383-0107 E-mail: <a href="mailto:tnewberry@tocc.edu">tnewberry@tocc.edu</a> Office location: Ed Division Bldg; Room 107 Office hours: MW 3:15-4:45 or TTh 3-4 or by appt.
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### Course Description:

Global change biology is a new field of biology which explores the consequences of global environmental change on humans and ecosystems. This course focuses on climate change as a key driver of environmental change. Climate change is addressed by exploring causes of past and current climate change while providing a strong contextual setting for Native American students based on their own culture and traditional ecological knowledge. Impacts of climate change on humans and ecosystems are covered from a holistic and interdisciplinary perspective with an emphasis on understanding the interconnectedness of biotic and physical systems. Students will learn about and compare traditional knowledge with western science understanding of climate processes and effects. This course will explore mitigation and adaptation strategies for climate change impacts and will include an opportunity for students to develop ideas on how Native American nations can respond to a future of changing climate.

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## Student Learning Outcomes (SLOs) :

After completion of the course students will be able to .....

1. Apply basic concepts of meteorology, climatology and traditional ecological knowledge to describe and understand their local climate and environment.
2. Summarize how the earth's climate system works, and understand the physical processes and dynamic interactions of the biosphere, atmosphere, oceans, ice and land surface.
3. Describe changes in climate through time and be able to distinguish between long term geologic-scale climate change and recent human-caused climate change.
4. Explain how future climate changes are predicted, both globally and for their own region or tribal lands, and how scientists make predictions about future climate scenarios.
5. Discuss current impacts of climate change on humans and ecosystems as well as future predicted impacts.
6. Describe various approaches to collecting and analyzing data, including field data collection, visual data analysis, and using data to understand trends or discover underlying issues.
7. Apply scientific and traditional ecological knowledge toward positive solutions to the impacts of climate change while respecting tribal values and strengthening community ties.

## Course Structure:

This course consists of four parts each consisting of a varying number of modules (see *Himdag* cultural component below). Each module consists of PowerPoint lectures, assigned reading, and a quiz. Each module also contains some combination of, but not all of the following: documentaries, in-class activities, discussions, laboratory exercises, reflective writing and homework assignments. There are two final projects for this class: an individual project and a group project. The individual final project for the course is a Climate Change Controversy Report in which students choose a current controversial topic related to climate change and explore each side of the issue. The objectives of this Controversy Report are 1) to synthesize, apply, and add to course content by critically analyzing a current environmental issue related to climate change 2) to examine multiple perspectives and facets of a climate change issue by gathering information from a variety of sources, assessing the scientific credibility of the information, and determining the special interests (the players) involved and 3) to arrive at a personal opinion based on a well-researched, well-thought-out rationale. The group final project is the development of a Community-based Climate Change Adaptation Plan for our region. The Adaptation will integrate local traditional knowledge with scientific knowledge.

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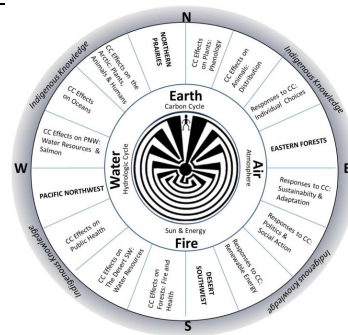
## Course Assessment:

Course assessment consists of quizzes, exams, discussions, short written assignments, informal in-class assessments, laboratory reports and a controversy report project which includes a paper and class presentation. Study guides will be available to help you prepare for exams. In accordance with my teaching philosophy in which I believe student learning occurs primarily through hands-on, real world application of course materials, exam and quizzes comprise less than 50% of the final grade (although they are still an important aspect of course assessment and your grade). In order to facilitate on-going faculty-student feedback and provide formative assessment, many class projects are divided into smaller intermediate steps such as topic choice, project proposals, and rough drafts. Student-to-student assessments are also included in this course though peer review of group participation and written assignments. I welcome student feedback about the course anytime. I will also provide students an opportunity to give me feedback on their course experience through an anonymous mid-course and final course evaluation.

## Texts and Materials:

“Red Alert! Saving the Planet with Indigenous Knowledge” Daniel R. Wildcat  
“Dire Predictions” by M.E. Mann & L.R. Kump

iPad: Earth the Operators Manual plus climate change apps



## Himdag Cultural Component:

This course teaches student about current climate change while providing a strong contextual setting for Tohono O’odham students based on the Himdag and traditional ecological knowledge. Throughout the course, students learn about and compare traditional knowledge with western science understanding of climate processes and effects.

This course was developed in collaboration with six other tribal colleges. The course structure is based on the four directions and the sacred hoop, or medicine wheel. The medicine wheel is used as an analogy for the inter-connectedness of the earth, air, water and the energy that binds them. The course uses the images, stories, and values of the medicine wheel to examine the interconnected effects of a

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changing climate on the four elements of the earth system.

The concept of climate is at the center of the medicine wheel. It is further embodied by the four directions and their representation as the four elements of fire, water, air and earth. The spokes of the medicine wheel radiate from the climate center and depict the many aspects of changing climate and its impacts. The entire medicine wheel is encircled by indigenous knowledge, a connected band of learning that has evolved to contain people's cumulative experience through time about the climate, the four elements, the earth sciences, and how we can adapt to climate change.

The course begins at the center of the medicine wheel by defining climate and by looking to Native American knowledge held in Creation stories. At TOCC, we include the Tohono O'odham Creation story. It then circles the medicine wheel once to provide an overview of the earth's system from the perspective of the four elements. The course then circles again around the medicine wheel, passing through all 16 spokes, and covering earth science topics on climate, climate change, change impacts and possible solutions.

## **Policies and expectations-**

**Course Policies Requirements:** (1) Attend class regularly; (2) Complete in-class and out-of-class assignments and submit to the instructor; (3) Attend all field trips; (4) Take all exams (5) Complete all class projects & presentations.

**Attendance:** You are expected to arrive to class on time and actively participate each class period. Quizzes and exams are given out at the beginning of class time. Field trips and class activities begin at the start of class and may be missed if you do not arrive to class on time. Because exams, labwork and/or other assignments potentially occur every class period, points potentially will be lost each class period missed. If you miss all or a portion of a class, then you are solely responsible for obtaining missed class material from fellow students. Complete attendance is mandatory during student project presentations; otherwise presentation points will be forfeited. Four consecutive, unexcused absences may result in withdrawal. You may request to be excused from class for religious observances and practices, for illness, for travel or for personal or family emergency. If you will be absent or have been absent, please notify the instructor as soon as possible.

**Make-up policy:** Missed exams can be made up within two days of the exam date. Late assignments that can be made up will be accepted but will be penalized 25%. Laboratories cannot be made up. At the instructor's discretion, extra credit opportunities and optional activities may be provided.

**Academic Integrity:** Violations of scholastic ethics are considered serious offenses by Tohono O'odham Community College, the Student Services Department, and by your instructor. Students may consult the TOCC Student Handbook sections on student code of conduct, on scholastic ethics and on the grade appeal procedure. Copies are available at Tohono O'odham Community College.

All work done for this class must be your own. While you may discuss assignments with other class members, the final written project must clearly be your own. You may use work from books and other materials if it is properly cited. Copying from a book without proper reference or from a person under any circumstances will result in an "F" for the assignment, and at the instructor's discretion, possibly an "F" for the course.

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## **ADA Compliance:**

Tohono O'odham Community College strives to comply with the provisions of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. If you have a learning problem, physical disability, or medical illness that requires you to have any special arrangements, please inform your instructor at the beginning of the semester so your academic performance will not suffer because of the disability or handicap.

## **Classroom Behavior:**

- Because of insurance limitations, non-registered visitors are not allowed at class sessions or on field trips.
- Possession of drugs, alcohol or firearms on college property is illegal.
- Food and beverages are allowed in classrooms.
- Pets, telephones, pagers and other electronic devices that distract students are not allowed in classrooms.
- Students creating disturbances that interfere with the conduct of the class or the learning of others will be asked to leave.
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## **Course Feedback:**

All assignments, written papers and quizzes will be graded and returned to the students one week after the assignment is due. E-mail and phone messages will be returned within two days. A student or the instructor may request a student conference at any time during the semester. Students are encouraged to monitor their progress and current grade by logging into Canvas and checking the gradebook.

## **Instructor Withdrawals:**

Students who have missed four consecutive classes, not submitted any assignments nor taken any quizzes by the 45th day census report, due on 9/28/2017 are assumed NOT to be participating in the class and will be withdrawn. Students may withdraw from class at any time during the first 2/3 of the semester without instructor permission and without incurring any grade penalty. Please be sure to withdraw yourself by October 26<sup>th</sup>, 2017 if you do not expect to complete the class, otherwise you may receive an "F" grade.

## **Incomplete (I) grade:**

"I" grades are not awarded automatically. The student must request an "I" from the instructor who will judge the student's ability to complete the course on his or her own. Generally the student must have completed over 80% of the course requirements with at least a "C" grade. An "I" requires a written contract between the student and the instructor listing work to be completed as well as how and when the work will be done. If the work is not completed within the contract period, the "I" grade automatically reverts to an "F." "I" grades will not be re-evaluated during the final two weeks of the semester when class activities are normally at their most intense.

## **Special Withdrawal (Y) grade:**

The "Y" grade is an administrative withdrawal given at the instructor's option when no other grade is deemed appropriate. Your instructor must file a form stating the specific rationale for awarding this grade. "Y" grades are discouraged since they often affect students negatively. Your instructor will not award a "Y" grade without a strong reason.

**Final Grades:** Students will receive a grade transcript from the college mailed to the address given with registration materials at the end of the semester when all grades have been recorded.

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## **SPECIAL NOTE TO STUDENT:**

For privacy and security reasons, instructors are advised **NOT** to give grades over the telephone. Grades will only be emailed with written permission from the student.

Your instructor will make every attempt to follow the above procedures and schedules, but they may be changed in the event of extenuating circumstances.

Students submitting assignments through the mail or by email are advised to make copies for their own protection.

If you move during the semester, please file a change of address form with the Student Services Office, and inform your instructor.

GOOD LUCK!

## **Course Outline:**

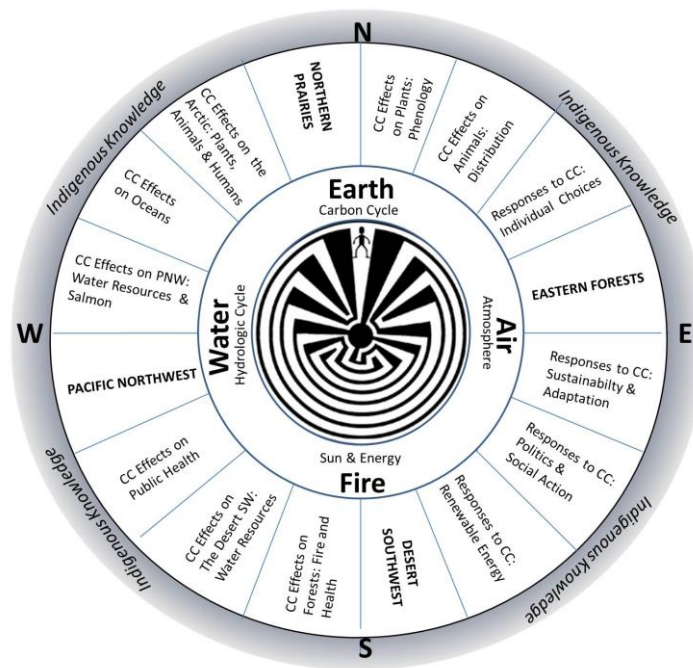
- I. Introduction to Climate
  - A. Climate Terminology & Fundamentals
  - B. Native American Creation Stories
  - C. Climate and Ecosystems of Native American Tribes
  
- II. The Earth's Climate System
  - A. Energy
  - B. Atmosphere
  - C. Land – Biomes
  - D. Ocean - Overview
  - E. Hydrologic Cycle
  - F. Carbon cycle
  
- III. Intro to Climate Change and Global Warming
  - A. Long-term changes in climate
  - B. Short-term climate cycles
  - C. Greenhouse Effect
  - D. Sources of Greenhouse gasses
  
- IV. Impacts on Humans and Terrestrial Ecosystems
  - A. Loss of Biodiversity
  - B. Changes in Seasons and Phenology
  - C. Changes in animal diversity and distribution
  - D. Impacts on Western Forests
  - E. Impacts on the Arctic
  - F. Impacts to Human Health
  
- V. Impacts on Water Resources and Aquatic Ecosystems)

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- A. Water in the Arid Southwest
- B. Snow, ice and glaciers
- C. Oceans and rising sea level
- D. Ocean, streams and salmon

- VI. Sustainability, Mitigation and Adaptation
  - A. Renewable Energy
  - B. Climate Change Legislation
  - C. Social Change and Transformation

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This course combines the Man in the Maze (a symbol for life's journey and O'odham Himdag), the four directions, and the medicine wheel concept from Native Americans in central North America, as an analogy for the inter-connectedness of the Earth, air, water and the energy that binds them. It draws from the images, stories, and values of O'odham and other Indigenous knowledge sources to examine the interconnected effects of a changing climate on the four elements of the Earth system.

The climate, especially the climate of the Sonoran desert and Tohono O'odham lands, is presumed to be at the center and is driven by the four elements of Earth (Carbon Cycle), air (Atmosphere), water (Hydrologic Cycle), and fire (Sun & Energy). It is further embodied by the four directions and each direction is associated with one of these four elements. The spokes of the medicine wheel radiate from the center and depict the many aspects of changing climate and its impacts. The entire image is encircled by indigenous knowledge, a connected band of learning that has evolved to contain people's cumulative experience through time about the climate, the four elements, the Earth sciences, and how we can adapt to climate change. Following the spokes of the circle illustrates the interconnectedness of all aspects of climate and Earth's system.

The course begins at the center by defining climate and starting from O'odham traditional knowledge of the Sonoran desert and climate. In addition, we will explore the knowledge of other Indigenous people from different parts of North America to begin to learn how they understand their traditional lands and the climate. We then will follow the medicine wheel once around to provide an overview of the Earth's system from the perspective of the four elements. The course then circles again around the medicine wheel, passing through all 16 spokes, and covering Earth science topics on climate, climate change, change impacts and possible solutions.

Thus the analogy (the Man in the Maze and the medicine wheel) for this class has four concentric circles: the center (O'odham Himdag and climate), the four directions (holistic overview of earth's climate and interconnectedness), 16 spokes of the medicine wheel (more in depth view of all climate-related topics), and the outer circle of humans and culture (Indigenous knowledge).



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## PART ONE

### The Center: O'odham and Indigenous Knowledge of local Environments and Climate

This section is an introduction to the environment and the climate from Indigenous perspectives

- Include creation stories (O'odham and those of other tribes that can be shared) as an Indigenous knowledge framework
- Provide students with basic concepts of weather and climate and a place-based introduction to their local climate
- Begin building student awareness on 'ways of knowing' and comparing and contrasting traditional knowledge with Western science approaches.

Date	Topic Module	Dire Predictions Reading	Red Alert Readings & Discussions	Class Activities & Assignments
8/14 & 8/16	Introduction to the syllabus, texts, course goals	Pgs. 120-121		Overview to Impacts of Climate Change
8/23	Native Science & Western Science			Reading & Discussion due <b>8/26</b> : V. Deloria: "Traditional Technology," <i>Spirit &amp; Reason</i> , pgs. 129-136 Reading & Discussion due <b>9/2</b> : L. Little Bear: "Forward" and G. Cajete: "Introduction" in <i>Native Science</i> , pgs. ix-xii & 2-9.
8/28	Creation's Original Instructions			Reflection due <b>8/22</b> : J. Bruchac: "Origins" in <i>Our Stories Remember</i> , pgs. 58-70;
8/30	Guest Lecture on "Deep Time" by Daniel Aiken			Summary Paper due 9/7
9/6	Introduction to Weather & Climate: O'odham & Climatological Perspectives		Introduction pgs. 1-12 (Discussion #1)	Lab 1: Variables of Weather and Climate

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## **PART TWO**

### **The Four Directions: A Holistic View of the Earth's Climate System**

This section presents a holistic view of the earth's climate using the four directions of the medicine wheel to teach the basic earth system physical components that control climate.

- Introduce the Earth's Climate System. Help students to move from the local scale of previous section to the global scale.
- Provide students with the fundamental earth science concepts they will need to understand climate change topics by using the four elements: fire, air, water, earth.
- Introduce the sun and global energy budget, atmosphere, hydrologic cycle, and carbon cycle
- Emphasize the similarity of the earth system approach of western science and the interconnectedness between the four elements from the perspective of native knowledge
- Introduce students to climate change and what is causing the climate to change. Explain the greenhouse effect, rising global temperature and climate change projections for the future

<b>Date</b>	<b>Topic Module</b>	<b>Dire Predictions--Reading</b>	<b>Red Alert Readings &amp; Discussions</b>	<b>Labs, Class Activities &amp; Projects</b>
9/11	Introduction to Energy and the Sun	"What's up with the weather (and the climate!)" (Pgs 10-15)	"Red Alert" pgs 13-21 (Discussion #2)	Finish Lab 1
9/13	Character of the Earth's Atmosphere		"The Truth is Not Inconvenient it is Deadly" Pgs 23-38 (Discussion #3)	
9/18 & 9/20	The Hydrologic Cycle	"Ice Kingdoms" (Page 15)	"Indigenous Knowledges: Where We Touch the Earth" pgs 73-86 (Discussion #4)	Lab #2: Unique Properties of Water
9/25 & 9/27	The Carbon Cycle & Greenhouse Effect	<ul style="list-style-type: none"> <li>• "What are the important greenhouse gases, and where do they come from?" (Pages 26-27) and "Carbon-cycle feedbacks: Nature's response to CO<sub>2</sub>" (Pages 94-97)</li> <li>• "Feedback loops compound the greenhouse effect" (Pages 24-25), "Greenhouse gases on the rise" (Pages 32-33) "Couldn't the increase in atmospheric CO<sub>2</sub> be the result of natural cycles?" (Pages 34-35), and "It's getting hotter down here" (Pages 36-37)</li> </ul>		Finish Lab #2 9/26 <b>Controversy Question: 9/26</b> Water in my Land Due Lab #3: Temperature trends at Organ Pipe National Monument

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## PART THREE

### Spokes of the Medicine Wheel: Climate Change and Its Impacts

This section explores the impacts of climate change and introduces responses and solutions.

#### Spokes of the Medicine Wheel: Earth spokes (North)

- Ecology/ geography orientation to the northern prairie ecosystem, culture of the Native peoples of the region and students at United Tribes Technical College
- Effects of changing climate on animals and plants. Introduce ideas of species distribution and evidence of changes in bird/animal ranges that have occurred. Effects of changing climate and seasonality on plant phenology and impacts on traditional plants.
- Use climate change impacts on the Arctic as a culminating topic that integrates many of the science topics learned and returns/circles to the start of the course with climate at the center and an indigenous framework

#### Spokes of the Medicine Wheel: Fire spokes (South)

- Ecology/geography orientation to the arid Southwest, culture of the Native peoples of the region and students at Tohono O'odham Community College and Din'e College
- Use changes in forest health and forest fire regime as an example of the multiple interacting effects of changing climate on ecosystems. Lab on Dendrochronology to illustrate how scientists learn about past climate.
- Climate change impacts on the arid southwest with an emphasis on water resources, including changes in precipitation and drought, and water resource management.
- Survey of renewable energy alternatives to the use of fossil fuels.

#### Spokes of the Medicine Wheel: Water spokes (West)

- Ecology/geography orientation to the Pacific Northwest, culture of the Native peoples of the region and students at Northwest Indian College
- Survey climate change impacts in the Pacific Northwest with an emphasis on mountain streams, changing snow amounts and timing, and glaciers. Effects of climate change on salmon and salmon management and tribal fisheries.
- Survey climate change effects on oceans including global circulation, CO2 cycling and sequestration and rising sea level. Impacts of changing ocean chemistry and sea level rise.
- Climate change impacts on public health and human welfare. Examples of the relationship between human's health and their climate environment.

Date	Topic Module	Dire Predictions	Red Alert	Class Activities & Assignments
10/2	Biome/Climate Regions of North America			Lab #4 Climate and Biomes
10/9 & 10/11	Climate change impacts and solutions: Climate Change, Water		Sovereignty: Self-Determination or Self Termination" (Pages 39-54) Discussion #5	Group Assignments: A Call to Action Project

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	and Traditional Ecological Knowledge in the Southwest			
10/16	Climate change impacts and solution: Prairie (UTTC)		"Future: Wind Power on the Plains," pgs. 92-97 "Indigenous Dwellings versus Spec Houses" (Pages 115-120) Discussion #6	Lab #5: Climate Variability on the Plains
10/18	Climate change impacts and solutions: Pacific Northwest (NWIC)		"A Red Alert for Indigenous Action in Life-Enhancing Cultures" (Pages 55-71) Discussion #7	
10/23	Climate change impacts and solutions: Eastern Forests (Menominee)		"Realizing Our Human Selves in the Nature-Culture Nexus" (Pages 99-111) Discussion #8	
10/25 & 10/30	Climate change impacts on Western Forests	Read "Back to the future: Deep time holds clues to climate change" (Pages 40-43), "Ecosystems: Worth saving?" (Pages 112-113), "Profile: James Lovelock..." (Pages 120-121), "Earth, Wind, and Fire," (Pages 134-135) and "Forests: Source or Sink" (Pages 174-175)	"Indigenous Knowledges: Where We Touch the Earth" (Pages 73-97) Discussion #9	Lab #6: Dendrochronology
11/1	Climate Change Effects on Animals: habitat, species distribution, biodiversity	"The highway to extinction" (Page 118-119)	"The Truth is Not Inconvenient it is Deadly" (Pages 23-38) Discussion #10	Lab #7: Animal Biodiversity
11/6 & 11/8	Climate Change Effects on Oceans: chemistry,	Read "What can a decade of western North American drought tell us about the future?" (Pages 48-51), "What can the European Heat		Lab #8: Thermohaline Lab Rough Draft Controversy Paper for

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	global circulation, rising sea levels	Wave of 2003 tell us about the future?" (Pages 52-55), "A Tempest in the Greenhouse: Have Hurricanes become more Frequent or Intense?" (Pages 56-57), "The Day After Tomorrow" (Pages 60-61), "The Last Interglacial: A Glimpse of the Future" (Pages 62-63), and "How Sensitive is the Climate?" (78-83)		<b>Peer Review Due : 11/8</b>
11/13 & 11/15	Climate Change Effects on the Arctic: survey of climate impacts on plants, animals and human subsistence	"The geographical pattern of future warming" (Pages 92-93) and "The Polar Meltdown" (Pages 138-139)		Lab #9: Arctic maps <b>Controversy Paper due 11/13</b> <b>CR Presentations 11/15</b>

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## PART FOUR

### Indigenous Knowledge: Solutions to Climate Change and its Impacts

This section focuses on human responsibility and the responses to climate change emphasizing the role of indigenous knowledge. This section uses the Air/East spoke of the wheel.

- Ecology/geography orientation to the Eastern Forests, culture of the Native peoples of the region and students at College of the Menominee Nation
- Tribal community sustainability and adaptation planning. Menominee Nation sustainable forestry program and climate change mitigation.
- Political and social responses to climate change. Understanding Kyoto and Copenhagen and the international agenda.
- Personal responses to climate change. Understanding an individual's carbon footprint, sustainable lifestyles, and responsible behavior towards our planet.

Dates	Topic Module	Dire Predictions Readings	Red Alert Readings & Discussions	Class Activities & Assignments
11/20 & 11/22	Sustainability and Adaptation: Renewable Energy & Agriculture	"Famine: More people, less water, less food; A hard row to hoe," and "Greener Acres" (Pages 130-131, 152-153, & 170-173) "It's the economy, stupid!; Solving Global Warming; Where do all those emissions come from?; Keeping the power turned on; On the road again" and "Industrial CO2 pollution	But what can I do about it?" (Pages 180-183) 7 "After Progress: A Reexamination of Traditional Technologies." (Pages 113-134) Discussion #11	
11/27 & 11/29	Responses to Climate Change: Politics and Social Action	"Global problems require international cooperation; Can we achieve sustainable development?; The ethics of climate change; The known unknowns and the unknown unknowns; The urgency of climate change" and "Where does that leave us?" (Pages 184-197)	"A Modest Conclusion: We Cannot Save Ourselves without Some Human Homeland Maturity" (Pages 135-139) Discussion #12	
12/4				<b>A Call to Action: Group Community-based Adaptation Plan and Presentations due: 12/4</b>

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<b>GRADE TRACKING FORM BIO 154N FALL 2016</b>			
<b>Part One</b>	<b>Module</b>	<b>Possible Points</b>	<b>Points Earned</b>
Part One	<b>Intro to course</b>		
	How does climate change affect us?	20	
	Traditional Technology Reading and Discussion	10	
Part One	<b>Creation's Original Instructions</b>		
	Creation Story Reading and Discussion	10	
Part One	<b>Native Science</b>		
	Native Science Reading and Discussion	10	
Part One	<b>Introduction to Weather, Climate and Local Climate</b>		
	Laboratory 1-1	15	
	Laboratory 1-2	10	
	Conversions	5	
	Quiz 1--Part One-M1-3	25	
Part Two	<b>Sun &amp; Energy</b>		
	Quiz 2--Sun & Energy	10	
Part Two	<b>Atmosphere</b>		
	Quiz 3--Atmosphere	10	
Part Two	<b>Hydrologic Cycle</b>		
	Water Lab	20	
	Water In My Land	10	
	Quiz 4 Hydrosphere	10	
Part Two	<b>Carbon Cycle (GHG &amp; Temperature)</b>		
	Quiz 5--Part One--Carbon	10	
	Carbon Homework--Vostok	10	
	Carbon Footprint	20	
Part Three	<b>Biomes</b>		
	Lab: Handout on Climate & Biomes	15	
	Lab: Climate regions and Biomes (Part One)	20	
	Lab: Climate Diagrams (Part Two)	10	
	Reading: Climate Change Predicted to Drive Trees No.	10	
	Quiz: Biomes	10	
Part Three	<b>Regional Climate Change Impacts--Southwest</b>		
	Prediction of impacts of CC on water	15	
	Stakeholder Analysis of GRIC Case Study	15	
	Quiz: Southwest Region	15	
Part Three	<b>Climate Change, Animals and Biodiversity</b>		
0	Quiz: Biodiversity	10	
Part	<b>Climate Change and the Arctic</b>		

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Three			
	Homework: Arctic		10
Part Four	<b>Responses: Sustainability and Adaptation</b>		
	A Call to Action Presentation		48
	A Call to Action--Climate Change Adaptation Plan		52
	Inconvenient Truth		20
ETOM	Dialectical Journal Preface & Ch 1		10
	Dialectical Journal Ch 2		10
	Discussion Questions for assigned ETOM Chapter		10
	ETOM Discussion		20
Red Alert	Discussion #1		10
	Discussion #2		10
	Discusssion #3		10
	Discussion #4		10
	Discussion #5		10
	Discussion #6		10
Exams	<b>MIDTERM</b>		100
	<b>FINAL</b>		100
Paper	<b>CONTROVERSY REPORT</b>		
	Controversy Questions		10
	Controversy Peer Review		10
	Controversy Paper		60
	Controversy Presentations		40
			905

**DISCLAIMER:** This syllabus is designed to evolve and change throughout the semester based on class progress and interests. You will be notified of any changes as they occur.