COURSE TITLE: **CLIMATE CHANGE FOR TEACHERS & STUDENTS**

WA CLOCK HRS: **60**
OREGON PDUs: **60**
PENNSYLVANIA ACT 48: **60**

NO. OF CREDITS: **6 QUARTER CREDITS**
[semester equivalent = 4.00 credits]

INSTRUCTOR: **Charity Staudenraus**
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COURSE DESCRIPTION:
This course meets OSPI's STEM requirements

Climate change poses the single largest, global threat to life on Earth, and yet the United States and our schools lag far behind the international community in educating and acting responsibly to mitigate the causes and effects of a warming planet. This online course for grades K - 12 teachers uses excellent platforms developed by NASA and the EPA to educate about the science of climate change in kid-friendly, interdisciplinary ways. Youthful graphics, games, lesson samples that cut across science, social studies and math, virtual expeditions to places where climate change is visible, CO2 footprint calculators and more make this a rich learning environment from which grades K - 12 teachers will develop their own units and themes—whether that's oceans, birds, butterflies, fish, trees, fresh water supplies. Many of your common science units can be modified with a climate change perspective (ie ocean life, plants and animals). There are no written texts for this course. All reading is online.

LEARNING OUTCOMES: Upon completion of this course, participants will have:

- A reliable knowledge of the science behind climate change and the important role played by CO2 and other greenhouse gas (GHG) emissions.
- Knowledge of and the ability to describe the many impacts of climate change and the cycles involved, such as warming oceans, more intense storms, shifting habitat, growing range of invasive species, ocean acidification, loss of coral, stress to trees and plants and wildlife and more.
- A deeper appreciation for how significant a global threat climate change poses.
- A working knowledge of the NASA and EPA web sites and how to use the tools they offer in bringing the message of climate change to their K-5 students.
- A range of options to mitigate the effects of climate change as well as adaptive strategies for a warming planet.

COURSE REQUIREMENTS:
Completion of all specified assignments is required for issuance of hours or credit. The Heritage Institute does not award partial credit.

The use of artificial intelligence is not permitted. Assignment responses found to be generated by AI will not be accepted.

HOURS EARNED:
Completing the basic assignments (Section A. Information Acquisition) for this course automatically earns participants their choice of CEUs (Continuing Education Units), Washington State Clock Hours, Oregon PDUs, or Pennsylvania ACT 48 Hours. The Heritage Institute offers CEUs and is an approved provider of Washington State Clock Hours, Oregon PDUs, and Pennsylvania ACT 48 Hours.

UNIVERSITY QUARTER CREDIT INFORMATION

REQUIREMENTS FOR UNIVERSITY QUARTER CREDIT
Continuing Education Quarter credits are awarded by Antioch University Seattle (AUS). AUS requires 75% or better for credit at the 400 level and 85% or better to issue credit at the 500 level. These criteria refer both to the amount and quality of work submitted.

1. Completion of Information Acquisition assignments 30%
2. Completion of Learning Application assignments 40%
3. Completion of Integration Paper assignment 30%

CREDIT/NO CREDIT (No Letter Grades or Numeric Equivalents on Transcripts)
Antioch University Seattle (AUS) Continuing Education Quarter credit is offered on a Credit/No Credit basis; neither letter grades nor numeric equivalents are on a transcript. 400 level credit is equal to a "C" or better, 500 level credit is equal to a "B" or better. This information is on the back of the transcript.

AUS Continuing Education quarter credits may or may not be accepted into degree programs. Prior to registering, determine with your district personnel, department head, or state education office the acceptability of these credits for your purpose.

ADDITIONAL COURSE INFORMATION

REQUIRED TEXT
There are no text required for this course. Online reading.

None. All reading is online.

MATERIALS FEE
There are no materials fees.

ASSIGNMENTS REQUIRED FOR HOURS OR UNIVERSITY QUARTER CREDIT

A. INFORMATION ACQUISITION
Assignments done in a course forum will show responses from all educators who have or are taking the course independently. Feel free to read and respond to others' comments.
Group participants can only view and respond to their group members in the Forum.

Assignment #1: COURSE FORUM: Introduction
View the videos of climate change activist Bill McKibben and actor Leonardo Di Caprio who speak passionately about the need to address climate change and lower our global carbon footprint. Then in 250-500 words introduce yourself, providing background on your personal stance about climate change, your professional situation and what you hope to gain from this course. Feel free to respond to any other postings from educators who are also taking this course.

Bill McKibben

https://www.youtube.com/embed/NvfAfQivnmQ

Leonardo DiCaprio
https://www.youtube.com/embed/vTyLSr_VCcg?autohide=1&controls=1&showinfo=0

Assignment #2: Climate Change Essentials
We'll view three videos which provide an overview of climate change essentials, the climate science, effects of global warming and long term risks. While some of the information is redundant, this helps reinforce the important points being made. More specifics will come from the in-depth resources we'll explore provided by NASA and the EPA.
1. View and take notes on this PBS video Climate Science: What You Need to Know which covers some of the basic science of climate change. This video is from 2014, but is still the most consolidated video available explaining climate change with quality images and science. This video was produced by I**t's Okay To Be Smart** from PBS Digital Studios and they have many additional videos you can find in their YouTube channel by searching for "climate change".

https://www.youtube.com/embed/ffjIyms1BX4?autohide=1&controls=1&showinfo=0

2. View and take notes from the Climate Change Explained video produced by The Daily conversation (TDC) based on a NY Times article on climate change.
https://www.youtube.com/embed/ifrHogDujXw?autohide=1&controls=1&showinfo=0

3. View and take notes on this TED Talk (2016) by Al Gore, former Vice President and an enthusiastic, highly informed climate educator since leaving office. You can stop at around 12 min 53 seconds as the rest of the video we'll view in a later assignment.
https://www.youtube.com/embed/u7E1v24Dllk?autohide=1&controls=1&showinfo=0

4. Read this article on Human Activity and Trees

5. Read and answer the Review Questions.

6. Then in a 500-750 word essay describe:

- What's at stake in the climate crisis
- How do you imagine climate change will affect you, your children and grand-children
- What was information that surprised or was new to you
- Discuss your thoughts on how we can really look at the hard and frightening facts of climate change and not go into overwhelm or hopelessness.

Assignment #3: NASA's Climate for Kids-Tour of Big Questions
Go through the entire guided tour of the big questions on NASA's Climatekids site. Make notes as you go. This site contains significantly less than it did in 2016. I will attach a few more resources to explore below. After you review the resources, write about 500 words on what can be done to help mitigate climate change effects according to the NASA authors and other sources found (please cite additional sources and provide links).
http://climatekids.nasa.gov/big-questions/

Additional resources:

- Project Drawdown
- Think Resilience
- World Resources

Assignment #4: EPA Youth-friendly site on climate change

1. Our previous administration eliminated the EPA website, "A student's guide to Global Climate Change", however you can view an archived version of the website. There are no updates being made to the site, but you can view the historical site at two different urls (in case one is taken down): https://archive.epa.gov/climatechange/kids/index.html or https://www3.epa.gov/climatechange//kids/index.html. Review the links 'Learn the Basics', 'See the Impacts', 'Think Like a Scientist', and 'Be Part of the Solution' and make notes on all the content you read.
2. The historical site has a video link, it is also available here:
https://www.youtube.com/embed/ScX29WBJI3w?autohide=1&controls=1&showinfo=0

3. This website is now slow to load. Could you use it with your students? How?
4. Explore the Yale Climate Connections site. The site says 6-12th grade, but I see many of these resources being useful with students of all ages. The third link down on the page will give you access to two pages of External Resources. At the bottom of that document, you will see a link to The Teacher's Guide to Cranky Uncle which is truly phenomenal.
5. The EPA is now working to update their guide Climate Change guide for students, but in the meantime, they have this great page with links to some really fantastic resources.
6. Suggested Resources for older students: Drivers, Trends, and Mitigation, EPA Climate Indicators, United Nations: Climate Change, Global Change, BBC: Climate Challenge, The Money Saving Guide to Going Green at Home
7. Complete the Review Questions.
8. In 250+ words, identify how you could use the information in the archived EPA website and/or your chosen websites from the resources listed above, describe generally how you would integrate this information into your curriculum.

Assignment #5: COURSE FORUM: Climate Change Denial
Climate denial through false science sponsored mostly by the energy industry and their special interest groups have colored opinions against anthropogenic (human-made) global warming among a segment of the public as well as state and federal legislators.

Accordingly, among developed nations the United States is one of the few that have not yet fully embraced the reality of climate change and adopted actions accordingly. In fact, about one-third of congress and 30% of secondary teachers do not fully understand and accept the reality of climate change.

- Carefully review all the web sites listed below relating to Climate Denial.

Merchants of Doubt, a book and documentary film inspired by the work of Naomi Oreskes and Erik Conway showing how, like with the dangers of cigarette smoking, the science behind global warming has been thrown into doubt. Read the information on the home page and access the videos via the menu and look for "video resources": Merchants of Doubt

Watch: Bill Nye & Bernie Sanders Interview

Article on the Heartland Institute mass mailing to K-12 teachers

Read about the Science of Skepticism

Skeptic Organizations-be sure to review the online powerpoint.
Read: Utilities Knew: Documenting Electric Utilities' Early Knowledge and Ongoing Deception on Climate Change from 1968-2017

Watch: Simon Sinek talks about how we view Climate Change

Read: Common skeptic arguments

Skeptical Science

- Discuss with education colleagues, family and friends in your community what they think about climate change and their ideas on why more progress is not being made.
- If there are postings in this space, first read the comments from others, and respond to at least two posts.
- In 500-750 words write a summary analysis of your findings and views on why climate change action has gone so slowly. What's at the root of climate denial? Why are skeptics not open to the true facts about climate change? Suggest what could be done to make better progress.

Assignment #6: Carbon footprint: What is it and how is it calculated?
Carbon footprint is a concept devised by environmental leaders and used by governments, businesses and the general public to assess the effect of their activities on the release of carbon into the atmosphere.

1. View the following video developed by the Pacific Institute for Climate Solutions in British Columbia, Canada.

https://www.youtube.com/embed/VTfgNFz1DBM?autohide=1&controls=1&showinfo=0

2. EPA CARBON CALCULATOR
The EPA had a great calculator for kids, but our current administration has had it removed. Review and test out the following carbon footprint calculator.
There are a number of other carbon calculators online. Here is one from The Nature Conservancy. CarbonFootprint.com World Wildlife Federation Park City Green and Global Footprint Network

3. Do an online search of other carbon calculators as well as videos, graphics or web sites about carbon footprint that are appropriate for the age of students you teach.
4. Then in 250-500 words: a) describe the results of your investigations citing the name and internet address of resources you found most useful to you. Be sure to include one or more carbon footprint calculators appropriate for use with your students. Include ideas on how you might integrate the exploration of carbon footprint into your math, science and social studies teaching.

Assignment #7: Expeditions to Explore climate change
Different parts of the world are case studies showing the more extreme consequences of climate change and, therefore, can be regarded as examples of things to come on a broader scale. Treat these as expeditions to explore, discover and discuss.

The EPA kids' site used to have wonderful 'expeditions' for kids to take. You can view the site, but it loads incredibly slowly making it basically unusable in the classroom. You are encouraged to check out the EPA expeditions as a starting point **if they work for you** , but please move on if they do not load for you (takes about 60 seconds on my computer with a dedicated line).

- Assemble the materials, articles, photos and videos for at least **three** expeditions, with each expedition exemplifying a different consequence of a warming planet. Locations that are fairly close to you have a major impact with kids such as the melting of the glaciers on Mt Hood if you're in Portland.
- Choose from any of the following: agriculture and crop failure through droughts (Central Africa); more intense tropical storms

(Gulf of Mexico); declining snowpack (the Alps); melting arctic sea ice (the Arctic); rising sea levels (the Marshall Islands, Bangladesh); death in ocean coral formations (Great Barrier Reef, Australia). Or, please choose your own focus. If there are locations close to you then your students will see the impact more clearly.

- In 250+ words, list your materials & sources for each expedition, write a 1-2 paragraph summary of the relevant highlights and describe how you would integrate/adapt this information to existing curriculum.

Assignment #8: Online games & projects

1. Check out the Earth Ranger site and explore a minimum of 2 Resources.
2. Experiment with 4-6 of the games on the ClimateKids website
   or

   Explore 4-6 of the hands-on projects under Make Stuff.

3. Check out the Risk Factor information for your area.

4. Briefly describe in 250-400 words each game or hands-on project and indicate which of these you may find useful in your teaching.

5. For older students, the RTI Center for Climate Solutions could be a great resource.

Assignment #9: Exploring Lesson Possibilities

1. Review the Science & Engineering Practices http://climatekids.nasa.gov/science-standards/ on the NASA climate change site.
2. Explore the JPL site for teaching ideas and lessons.
3. Review the subjects/activities on the Teach About Climate Change page.
4. This is another great resource if your students are particularly engaged with animals: Animals At Risk from Climate Change

Then make a list of 6-8 subjects/activities which you reviewed, and think may be useful in your teaching. Briefly describe each one.

Assignment #10: COURSE FORUM: What Gives You Hope?
In spite of all the bad news about climate change, there is a global movement for change that gives us cause for hope.
1. View the video on major changes in history and the current global movement for change.

https://player.vimeo.com/video/192827438?portrait=0

2.View the remainder of Al Gore's video which you viewed in Assignment #2, but now skip ahead to the second part starting at about 12 minutes and 55 seconds. To do that just put your cursor on the red line in the lower half of the screen and move the red ball to 12:55 and then proceed.
https://www.youtube.com/embed/u7E1v24Dllk?autohide=1&controls=1&showinfo=0

3. View this video of the Global Powershift movement which mobilizes young people from around the world to fight for shifts in energy policy.
https://www.youtube.com/embed/HmlL-fS0jhU?autohide=1&controls=1&showinfo=0

4. Listen to the Podcast No Ordinary Lawsuit Episode 1 available here on itunes and visit the site Our Children's Trust.

5. Read this short article on how a shy teenager started a global climate movement in just 18 months and check out the video below.
Image type unknown
https://youtu.be/aUCD_24cygQ

https://www.youtube.com/embed/aUCD_24cygQ?autohide=1&controls=1&showinfo=0
6. Review 350.org

7. Review The Climate Reality Project

8. Review America's Pledge on Climate and Climate Change & Colleges

9. The following are breakthroughs in technology that are reason to have hope:

- A Dutch Teenage Inventor is working to clean plastic out of our oceans.
- Can We Really Scrub Carbon Dioxide From the Atmosphere?
- Can plastic roads curb waste epidemic?
- Detroit's urban farms: engines of growth, omens of change
- How a Technology from Iceland is Fighting Climate Change
- Decarbonization's New Deal

10. Write 500+ words about the following: a) What are the four things you found most hopeful in the resources you viewed. b) Did you experience an emotional moment and, if so, where and why? c) Share about some important actions you might like to take in the future to become more a part of the solution.
11. If there are other postings to this assignment, respond to at least one.

Assignment #11: COURSE FORUM: What did you do once You knew?
Significant progress on this greatest of all present challenges is today mired in political gridlock as well as citizen apathy, ignorance, doubt, fear, and a sense that climate change is too significant and hard for individuals to do anything about.

1. View this video on the actions taken by a group of young people once they knew. Sunrise Movement

2. View the video by teacher and poet Drew Dellinger who asks us to imagine a great-great-grandchild from the future asking us "What did do once you knew?" Text version

https://www.youtube.com/embed/nnCAj1_di48

3. View UN Climate Summit Poem "Dear Matafele Peinem"

https://www.youtube.com/embed/DJuRjy9k7GA
4. Next, review postings (if any) in this course forum and make a comment on at least two.

5. Then relax, close your eyes and imagine out into the far future that you are having a conversation with a great-great-grandchild, either your own or someone else's. See a face and hear a voice as clearly as you can. This could be some 100-150 or more years into the future when the fate of the planet will have been decided by the many generations that came before, none more important than our own, right now. This young person asks you: "What did you do when you knew about..." Pause and take your time in responding. Then write out your response using the first person (ie "When I first knew about climate change, I…). Write at least 250 words.

ADDITIONAL ASSIGNMENTS REQUIRED FOR UNIVERSITY QUARTER CREDIT

B. LEARNING APPLICATION
In this section, you will apply your learning to your professional situation. This course assumes that most participants are classroom teachers who have access to students. If you do not have a classroom available to you, please contact the instructor for course modifications. Assignments done in a course forum will show responses from all educators who have or are taking the course independently. ?Feel free to read and respond to others' comments. Group participants can only view and respond to their group members in the Forum.

Assignment #12: Meeting Science Standards with climate change lessons
Examine your state's science standards for your grade level as well as the Next Generation Science Standards on the NASA climate kids site (select Disciplinary Core Ideas). As you formulate your teaching unit on climate change, identify the standards you intend to meet with a unit you will create.
(http://climatekids.nasa.gov/science-standards/)

Please review New Jersey's new Climate Change Standards and briefly discuss (250 words) how you can further incorporate climate change in your lessons and units.

Assignment #13: Create and implement a lesson reflecting what you're learned In this course

Assignment #13: (Required for 400 and 500 Level)

Assignment #13-A:

- Adapt a lesson reflecting what you've learned in this course.
- Implement your lesson with students in your classroom.
- Write a 250-500 word commentary on what worked well and what could be improved.
- Include any student feedback or noteworthy student products.
- Submit your lesson to your instructor via the lesson tab below.
- You may download a copy of THI's lesson plan template here.
- Share what you've learned with other teachers taking our courses by checking the lesson library box when you submit your lesson.

OR

Assignment #13-B:
Use this option if you do not have a classroom available.

- Adapt a lesson to reflect what you've learned in this course. (Do not implement it.)
- Write a 500+ word article concerning any noteworthy success you've had as a teacher with one or more students.
- Please refer to the guidelines on our blog What Works: Teaching at its Best prior to writing your article.
- When you submit your article to your instructor, please also email a copy to Renee Leon THI blog curator and media specialist.
- Indicate whether or not you are OK with having your article considered for publishing on our website.
- Submit your article to your instructor via Response field and the modified lesson via Submit Lesson.
- As you submit your lesson, consider sharing it with other teachers taking our courses by checking the lesson library box.

Assignment #14: (500 level 0nly)
In addition to the 400 level assignments, complete **one** of the following:
Option A)
Search for and evaluate iPad apps that deal with climate change, severe weather or any of the other consequences of a warming planet. Then create a bibliography citing at least 6 apps, giving a brief description of each.

OR

Option B)
Prepare a Powerpoint, Keynote or video presentation for staff or parents in which you show how to address climate change instruction into the curriculum.

OR

Option C)
Conduct additional research into one of the impacts of climate change (ie ocean acidification, sea level rise, spread of infectious disease) or some aspect of mitigation of climate change (ie renewable energy like solar photovoltaic panels for residences and businesses). Cite your online and in-print reading sources as you summarize in 2-3 pages what you learned and how you'll use this information.

OR

Option D)
An assignment of your own choice with the instructor's prior approval.

C. INTEGRATION PAPER
Assignment #15: (Required for 400 and 500 Level)

SELF REFLECTION & INTEGRATION PAPER
(Please do not write this paper until you've completed all of your other assignments)

Write a 400-500 word Integration Paper answering these 5 questions:

1. What did you learn vs. what you expected to learn from this course?
2. What aspects of the course were most helpful and why?
3. What further knowledge and skills in this general area do you feel you need?
4. How, when and where will you use what you have learned?
5. How and with what other school or community members might you share what you learned?

INSTRUCTOR COMMENTS ON YOUR WORK:

Instructors will comment on each assignment. If you do not hear from the instructor within a few days of posting your assignment, please get in touch with them immediately.

QUALIFICATIONS FOR TEACHING THIS COURSE:
CHARITY STAUDENRAUS, M.A.T, received her BA from Willamette University, her MAT from Willamette University. Charity has experience teaching math, science, social studies, business, and language courses at the middle and high school level. She is currently serving on the 2014-2017 Oregon Science Content and Assessment Panel as well as the Oregon Instructional Materials Criteria Development Committee. In addition Charity is consulting on a Rutgers University and WPI project funded through multiple Department of Education and National Science Foundation Grants.

BIBLIOGRAPHY

CLIMATE CHANGE FOR TEACHERS & STUDENTS

WEB SITES

NASA CLIMATE FOR KIDS:NASA's Eyes on the Earth
http://climatekids.nasa.gov/
This excellent educational resource would be hard to develop without the scholarship, scientific knowledge and funding that is usually only found in large, government sponsored organizations. What's particularly appealing is the youth-oriented graphics, a wide array of game and activity options that make the NASA site immediately useful to teachers in their classroom presentations or for homework assignments which students can easily do on their own.

EPA A Student's Guide to Global Climate Change
http://www.epa.gov/climatechange/kids/index.html
While the EPA site is more basic than NASA's, it is quicker to review and may provide a somewhat easier tool for teachers to use. This site also has some nice features not found on NASA's which are the Climate Change Expeditions and the CO2 emissions calculator.

The National Wildlife Federation Climate Classroom for Kids
http://climateclassroomkids.org/
This is an excellent supplementary site that focuses on the Wildlife Federation mission of protection of animals and features species endangered by climate change such as polar bears, penguins, sea birds, tropical wildlife and more. The For Educators section and Fun Stuff for kids to do outdoors is well worth reviewing.

US Department of Energy
http://www1.eere.energy.gov/education/index.html
The US Department of Energy is a premiere, easily accessible resource for teachers to scope out alternate, renewable energy, with sections on energy literacy, greening your school plus a searchable database of lesson plans dealing with energy.

Climate Reality Project, Reality Drop
http://www.realitydrop.org/
Reality Drop is an online initiative of the Climate Reality Project founded by former Vice President Al Gore which aims to refute the various standard climate denier claims with counter arguments that can be "dropped" onto your Facebook pages. This is an excellent tool for students and teachers to spread the word about climate reality through their online social networks.

Climate Change Education.org
http://climatechangeeducation.org/
There are some really good resources for climate change education on this site. Check out the videos tab.

The Year of Living Dangerously
http://www.sho.com/sho/years-of-living-dangerously/home
This is a groundbreaking documentary series on SHO that explores the human impact of climate change. From the damage wrought by hurricane Sandy to the upheaval caused by drought in the Middle East, Years of Living Dangerously combines excellent storytelling from top Hollywood filmmakers with the narrative expertise of some of our brightest starts and respected journalists.

Web sites to explore Climate Denial
Article on teachers views of climate change
http://www.psmag.com/nature-and-technology/on-climate-change-confused-teachers-make-for-misinformed-students

Skeptical Science
http://www.skepticalscience.com

Skeptic Organizations
http://www.ucsusa.org/global_warming/solutions/fight-misinformation/global-warming-skeptic.html#.VsifPJMrLSI

Congressional Voting Record
http://www.ontheissues.org/default.htm

1/3 of Congress in Denial
http://grist.org/climate-energy/surprise-a-third-of-congress-members-are-climate-change-deniers/

Common skeptic arguments
http://billmoyers.com/2014/05/16/eight-pseudo-scientific-climate-claims-debunked-by-real-scientists/