

NATURE - WAS - HERE

Environmental Education - Media - Social Permaculture NatureWasHere.com

Course Syllabus

Climate Action

Spring 2020

Instructor Information

Instructor: Joshua Kruer
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Availability: M-F 9am-5pm EST

Course Information

Format: Video Lecture with Q&A via Zoom
Class Times: M-F 9-10am EST

Course Description/Overview

Welcome! This course is an overview of the global climate challenges we must address and how we can work together to become a more sustainable, intentional society. We will explore the effects of climate change, globally and locally, how it impacts every aspect of life. In each lesson, we will also examine ways that we, as individuals and collectively, can work toward solutions, many of which are already available to us. So, do we have the courage to change the world, for ourselves and future generations? Change starts with you.

Learning Objectives

Students will be expected to gain a deeper understanding of climate change around the world, from simply learning new terms and ideas to thinking more critically about the issue. Ultimately, students will be encouraged to care, to be better stewards of the earth and transition into a feeling of responsibility, being compelled to take action to help create a better world. Student performance will be measured by participation in group discussions as well as a group project, to better integrate knowledge. Participation is most important, engaging in discussion by asking questions and offering one's opinion or experience, by the course's end, students will receive a Certificate of Completion.

Upon successful completion of this course, students will be able to:

-Analyze climate issues around multiple topics and from diverse perspectives, both the issues of climate change and how to solve the issues, to be more sustainable.

-Compare and contrast various climate solutions like utilizing renewable energy, sustainable farming and more.

-Identify the basic concepts around climate change and sustainability.

In these examples, "Analyze" indicates high-level expected learning, "Compare and contrast" indicates middle-level learning, and "Identify" implies low-level learning.

It may be helpful to refer to this list of terms:

Weather

Atmospheric condition at any given time or place. It is measured in terms of wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather can change from hour-to-hour, day-to-day, and season-to-season.

Climate

Climate, generally, is usually defined as the "average weather," over a period of time ranging from months to thousands of years.

Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer. Climate change has occurred many times over the history of our planet, but this time it is undoubtedly caused by human activity.

Global Warming

The recent and ongoing global average increase in temperature near the Earth's surface and atmosphere.

Greenhouse Gas (GHG)

Any gas that absorbs infrared radiation (heat) in the atmosphere. Greenhouse gases include, carbon dioxide, methane, nitrous oxide, ozone, hydrofluorocarbons and more.

Carbon Dioxide (CO₂)

A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. CO₂ is the primary greenhouse gas responsible for rising global temperatures.

Methane (CH₄)

A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at *25 times* that of carbon dioxide (CO₂). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

Nitrous Oxide (N₂O)

A powerful greenhouse gas with a global warming potential of *298 times* that of carbon dioxide (CO₂). Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.

Greenhouse Effect

Trapping and build-up of heat in the atmosphere (troposphere) near the Earth's surface. Some of the heat flowing back toward space from the Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the Earth's surface. If the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase.

Industrial Revolution

A period of rapid industrial growth with far-reaching social and economic consequences, starting in the second half of the 18th century. The industrial revolution marks the beginning of a strong increase in combustion of fossil fuels and related emissions of carbon dioxide.

Renewable Energy

Energy resources that are naturally replenishing such as biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

Carbon Footprint

The total amount of greenhouse gases that are emitted into the atmosphere each year by a person, family, building, organization, or company. A carbon footprint includes GHG emissions from fuel that we burn directly, like by heating homes or driving cars. It also includes GHGs that come from producing the goods or services that we use, including emissions from power plants that make electricity, factories that make products, and even landfills where trash gets sent.

Ecological Footprint

The impact of a person or community on the environment, expressed as the amount of land required to sustain their use of natural resources.

Sustainability

Sustainability is the act of becoming more environmentally friendly in our daily life as individuals and as a society, of restoring the natural balance found on earth.

Living more sustainably *is* the path to solving climate change. To be more sustainable is to intentionally generate less waste, use less fossil fuels, and other practices, therefore lowering our carbon footprint and ecological footprint, thereby slowing global warming and solving climate change.

Course Schedule

10 Units, weekdays M-F from 9-10am EST

Week 1

- M — 5/4 — Introduction to Climate Change
- T — 5/5 — Saving Water, Our Source of Life
- W — 5/6 — How Mushrooms Can Save The World
- Th — 5/7 — Why Renewables Can't Save The Planet
- F — 5/8 — Products and The Pursuit of Happiness

Group Project

Create a poster demonstrating your understanding of one of the previous lessons. Use this as an opportunity to deepen your knowledge and share with your community. You can create an informational presentation or even a project proposal to help your community become more resilient to the effects of climate change or simply be sustainable. Perhaps you can suggest that together you invest in a community solar installation or a compost center to process the areas food waste for local gardens... The choice is yours, so have fun with it!

Week 2

- M — 5/11 — Reclaiming The Roadways
- T — 5/12 — How We Imagine A Sustainable Future
- W — 5/13 — Understanding The Human Animal
- Th — 5/14 — How To Be A Sustainability Leader
- F — 5/15 — group discussion and Q&A session

Pre-Reading Assignments and Resources

(enable CC / Closed Captioning for videos)

1. *Introduction to Climate Change*

- film, *An Inconvenient Sequel: Truth to Power*
- [Global Warming Visualized](#)
- [Ecological Footprint Calculator](#)
- [Project Drawdown](#)

2. *Saving Water, Our Source of Life*

- film, *Dark Water*
- further reading, [Facts About The Global Water Crisis](#)

3. *How Mushrooms Can Save The World*

- video, [Mushrooms as Medicine, Biopesticides and More](#)
- and video, [Regenerative Agriculture](#)
- further learning: the video, [How Mushrooms Can Save The World](#)

4. *Why Renewables Can't Save The Planet*

- video, [Why Renewables Can't Save The Planet](#)
- and, for further learning: the video, [More on Nuclear Power](#)
- [Solar Panel Calculator](#) (for personal use) and [GoSun Solar Stoves and More](#)

5. *Products and The Pursuit of Happiness*

- video, [The Paradox of Choice](#)
- further examination: the film, *Plastic China*

6. *Reclaiming The Roadways*

- video, [How Hong Kong Built The World's Best Public Transit](#)
- and, locate and visit a Bike Co-Op near you!

7. *How We Imagine A Sustainable Future*

- videos, [Magical Houses, Made of Bamboo](#) and [The Sustainable City](#)
- further inspiration: [Bhutan, The Only Carbon Negative Country In The World](#)
- further learning: the video, [The Venus Project](#)

8. *Understanding The Human Animal*

- videos, [Human Evolution](#) and [How Humans Evolved to Dominate Earth](#)
- further learning: watch an episode of Blue Planet 2 or Planet Earth 2
- further learning, cont'd: go to the forest to observe plant life and write in your journal (draw pictures, take notes on animal sounds, species and found habitat)

9. *How To Be A Sustainability Leader*

- video, [Our Climate Our Future](#)
- further learning: [Climate Stories](#)
- [Fossil Free](#) (find a chapter near you)
- [Global Climate Strike](#)
- further inspiration: [How We Are All Connected](#) and documentary film, *Samsara*
- review: video, [Top 100 Solutions to Reverse Global Warming](#)

Lesson Plans

1. Introduction To Climate Change

Introduction

Overview

- presentation format(s) : “me, you and us”
 - about the presenter
 - Nature Was Here
 - about you
 - introduce yourself: your name and a hobby/ interest
 - more opportunity at the end of this lesson
 - about us
 - what do you want to learn?
 - what do we wish to accomplish?
- course goals and expectations
 - Certificate of Completion
 - empowering you with solutions

Defining Important Terms

- weather vs climate*
- climate change*
- global warming*
- Greenhouse Gases (GHGs)*
 - Carbon Dioxide (CO₂)*
 - Methane (CH₄)*
 - Nitrogen Oxide (precursor to Nitrous Oxide (N₂O))*
 - Freon and other refrigerants*
- the greenhouse effect*

Addressing Skepticism

- misinformation
- perception and *scientific consensus*
- history of *climate predictions* and observable data
- satellite data of *atmospheric carbon* and *ice core* data
- history of global average temperature

Scenarios

- edify IPCC and the need for a goal of 1.5 C
- current warming projections

Global Climate Challenges

Effects of *Global Warming*

- extreme weather phenomena
- forest fires and deforestation
- rising sea levels
- droughts and water shortages
- lost productivity
- climate refugees*
- rising cost of food and consumer goods
- spread of diseases

Climate Change and Pollution

Q&A Intermission

Introduction to Sustainability

Solutions to *Climate Change*

- renewable energy*
- carbon footprint, carbon pricing, carbon tax and carbon budget*
- emissions gaps and climate change performance mapped by country*
- top climate solutions: Project Drawdown

Celebrate The Good!

- actions to celebrate
- visualizing climate recovery through lockdown
- dreaming of the future...

Meet & Greet continued and Q&A

2. WATER - Saving Water, Our Source of Life

Introduction

Our Relationship With Water: Appreciation Through Story

- all of us come into this world through water...
- our "Pale Blue Dot"

The Water Cycle: Natural vs Urban

Global Water Challenges

Climate Change and Water

- warming oceans
 - acidification*
 - "coral bleaching"*
- freshwater shortages
 - floods
 - drought
 - mismanagement
- sea level rise
 - thermal expansion*
 - melting ice caps
 - permafrost*

Water Pollution

- Combined Sewer Overflow (CSO)* in sewer systems
- "fracking"* wastewater from natural gas production
- issues with oil and gas pipelines

Q&A Intermission

Sustainable Water Solutions

Urban Planning and Design

- introduction to *agroforestry*, improving water retention
 - less water pollution from fertilizer runoff
 - requires less water for growing crops
- choosing hardier, drought-resistant crops

Modifying Individual Behaviors

- conserve water by eating less meat!
- introduction to vertical farming and *aquaponics* (more info in the next lesson...)
- "gray water"* systems
- homemade water filter
- water quality and testing ...get rid of chlorine in water, easy!
 - pH* (acidic or basic)
 - Total Dissolved Solids (TDS)* (salts and minerals)
 - turbidity* (organic solids)
 - temperature (warm water is more likely to harbor bacteria)
- 5-minute shower challenge

Debate and Q&A

- Is water a human right?
- Should governments or corporations decide regulations? (story)
- Is it necessary to ration water, say for watering golf courses?
- Do you know where does your home gets water from?
- Where is your nearest body of freshwater?

3. FOOD - How Mushrooms Can Save The World

Introduction

Foraging for Mushrooms and Wild Edibles

Global Food Challenges

Modern Agriculture

- industrial farming practices
 - crops
 - inefficient land usage
 - monoculture* crops
 - synthetic fertilizer, *herbicide* and *pesticide* usage
 - eutrophication*
 - livestock
 - water use
 - inefficient land usage
 - deforestation*
 - growth hormones and antibiotics
- industrial fishing
 - overfishing
 - farmed fish: the most toxic food in the world

An Unnecessary Problem

- introduction to food waste
- world hunger

Q&A Intermission

Sustainable Food Solutions

Reinventing Modern Agriculture

- vertical farming
- hydroponics* vs *aquaponics*
- Genetically Modified Organisms (GMOs)* vs *heirloom* varieties

Conventional vs Regenerative Agriculture

- organic* farming
- regenerative agriculture*
 - no pesticides or artificial fertilizers (only criteria for “*organic*”)
 - managed grazing pastures for livestock
 - crop rotation and rotating pasture for grazing livestock
 - no-till* practices and *cover crops*
- agroforestry* and *food forests*
- permaculture*
 - companion planting* and *polycultures*
 - planting zones
 - home gardens
 - what is *compost*?

Reducing Food Waste

- compost* and *climate change*
- food shares / *potlucks*

Meat Substitutes

- insect protein
- plant-based protein
- lab grown meat
- and, mushrooms!

How Mushrooms Can Save The World

- what are mushrooms?
- preventing soil erosion and regulating nutrients in the soil
- biopesticides*
- carbon sequestration* and *bioremediation*
- mushrooms as food: meat substitutes and choice edibles
- medicinal mushrooms for bees and humans

Debate and Q&A

- Are GMO's bad for our health?
- Would you be afraid of trying a new mushroom?
- Is becoming vegan the most ethical option? (story)

4. ENERGY - Why Renewables Can't Save The Planet

Introduction

Energy Savings

- Do It Yourself (DIY) solar kits
- smart thermostats
- changing lightbulbs
- cooking with solar

Global Energy Challenges

Global Power Plant Fleet

- past and current energy consumption
- emissions by source (30% of all carbon emissions from energy sector)

Fossil Fuels

- coal power
 - mountain top removal
 - air pollution and *acid rain*
 - current trend
- petroleum oil
 - air and water pollution (review and oil spills)
 - oil exports and "*peak oil*"
 - market trends and effects of *carbon pricing* and *carbon tax*
- natural gas
 - hydraulic fracking*
 - water pollution
 - generating electricity not met by oil

Q&A Intermission

Sustainable Energy Solutions

Renewable Energy: The Future Is Here

- hydroelectric* power
 - many rivers = many opportunities for dams
 - environmental costs: water quality, flooding, fish migrations, etc.
- battery technology
 - improved *energy density* and lower cost
 - environmental impacts of mining operations
- wind power
 - current potential
 - residential wind power
- solar power
 - how it works
 - environmental impacts of land use and review mining operations
 - current potential
 - residential and parking lot solar power
 - needing base power load with solar and wind...
- Geothermal* power
 - how it works
 - current potential

De-stigmatizing Nuclear Power

- how nuclear power works
- high economic cost, offset by carbon savings
- safety and storage: myths and regulations

Theoretical Energy Sources

- fusion*: infinite energy?
- remembering the work of Nikola Tesla

How to "Decarbonise" The Energy sector

Debate and Q&A

- Is nuclear power safe?
- Do the benefits of Hydroelectric dams outweigh the costs?
- Should we implement a slow or immediate transition to renewables?
- What is more important, economic or environmental benefits?

5. PRODUCTS - Products and The Pursuit of Happiness

Introduction

"Buyer's Remorse": Paralyzed by Choice

- consumerism and defining satisfaction
- reducing waste: my experience
 - distributing paper straws with Nature Was Here
 - making protein bars

Ecological Footprint Calculator

Global Production Challenges

Plastics

- the history of plastic
- single-use plastic and oil
- plastics lifecycle and lifespan
- cleanup efforts
 - ocean and river cleanup
 - land cleanup: #trashtag
- landfills and greenhouse gases
- poverty and plastic

Textiles and Other Resource-Intensive Materials

Greenwashing

Corporate, Federal and Individual Actions; We Are More Than Consumers

Q&A Intermission

Sustainable Product Solutions

The 5 R's: Refuse, Reduce, Reuse, Recycle and Rethink

- re-imagining landfills for fuel, energy and mining materials
- recycling: a last resort
 - Conventional recycling
 - intro to a *circular economy*
- reuse
 - repurposing / "upcycling"
 - creative reuse, continued...
 - repairing products and the "right to repair"
- reduce: plastic alternatives
 - bioplastics
 - defining *biodegradable*
 - biopolymers: expensive, yet degrade faster
 - paper and bamboo
 - hemp
 - requires less water and land than other materials
 - most effective plant for carbon sequestration
- refuse: the first, most important step in preventing waste

A True Circular Economy

- Renewable Energy
- Biodegradable raw materials
- evolving our market systems
- product design: easy to repair, modular parts
- supply chain collaboration
- high-value reuse and recycling

Zero Waste

Debate and Q&A

- Discuss *manufactured obsolescence* ...
- Any other creative reuse ideas?
- Is ethical consumption of goods effective for changing the market?

6. TRANSPORTATION - Reclaiming The Roadways

Introduction

Driving A Hybrid and Biking to Work

Global Transportation Challenges

Logistics

- designing routes
- prioritizing modes of transport

Individualized Transportation

- airplanes
 - inefficient carrying capacity
 - carbon emissions
- passenger vehicles: cars (and trucks)
 - traffic
 - carpooling
 - carbon emissions and emissions standards
 - conventional vs electric cars (and hybrids)
 - history of the electric car and growing popularity
 - autonomous driving*: safer and reduces carbon emissions
 - hypermiling*

Q&A Intermission

Sustainable Transportation Solutions

Public Transportation

- buses
 - efficient carrying capacity
 - electric buses
 - biodiesel* and other biofuels
 - growing popularity of alternative fuels (*ethanol* and others)
 - how *biodiesel* vehicles work
- conventional railways and the need for improved infrastructure
- the need for a comprehensive transportation network
- High Speed Rail (HSR)
 - history of HSR
 - China as the example to follow
 - emissions, comparing HSR to long distance air travel
- maglev* trains
 - how *maglev* works
 - comparing *maglev* to HSR
- The Hyperloop*
- bicycles
 - history and current overview of biking
 - growing popularity: safety in numbers
 - bike sharing
 - bike co-ops: adopt a bike and learn to repair
 - why you should bike: reduce emissions, for your health, etc.
- walking!
- behavior: proximity to work and access to public transit
- telecommuting*

Reclaiming Roadways

- a world designed for cars
- urban design: *multimodal transit*
- creative repurposing: bike paths and parks / greenspace

Debate and Q&A

- Is it safe to ride a bicycle in the street?
- Should bus or train fare be free for residents?
- Are electric cars safe?
- Should recreational flights be banned or limited?

7. GREENSPACE - How We Imagine A Sustainable Future

Introduction

Houseplants, Nature and *Ecotherapy*

Global Greenspace Challenges

Land Use: *Urban Sprawl*

- water runoff
- heat-island effect*
- suburban* vs urban areas
- cost comparison of suburban maintenance and services
- inefficient urban design in western cultures

Deforestation

- carbon sequestration* / *carbon sinks*
- deforestation* and meat production

Q&A Intermission

Sustainable Land Use and Greenspace Solutions

Improved Land Use

- forest restoration initiatives
- agroforestry* and forest management methods
 - stewardship* vs intentionally unmanaged forests
 - our relationship with trees
- carbon sequestration*
 - how it works
 - hemp, used for carbon "*drawdown*" and much more!
 - trees' capacity for sequestering carbon
 - forests as *carbon sinks*: *carbon neutral* and beyond...
 - offsetting carbon (and more) in urban environments

Cities of The Future

- visions from the past
 - The Venus Project and a *resource-based economy*
 - arcology* (combining architecture and ecology)
- modern inspiration
 - indoor greenspace and benefits of houseplants
 - living walls / vertical gardens
 - green roofs
 - sequestering carbon and reducing carbon footprint
 - heating / air efficiency and water conservation
 - rooftop gardens
 - Earthships* and *Eco-Villages* and creative DIY architecture
 - LEED certification
 - "*green*" buildings, literally and in principle
 - modern parks

Debate and Q&A

- Is Arcology unrealistic or feasible?
- Do you have space for a rooftop or backyard garden?
- How is improving city residents' mood important for sustainability?

8. WILDLIFE - Understanding The Human Animal

Introduction

Human Evolution

- our earliest ancestors: *Hominins*
- The “Stoned Ape” theory
 - explaining a rapid increase in brain volume
 - the resulting technical and cultural innovations
 - defining (induced) *synesthesia*
 - human migrations and proliferation

The Dawn of The *Anthropocene*

- competition: a primal instinct, a desire to dominate
- Earth's 6th extinction event, caused by humans
- measuring our evolutionary success: life expectancy
- adaptive and cultural evolution
- ...are humans natural anymore?

Global Wildlife Challenges

Defining *Extinction*

- near threatened
- vulnerable
- endangered
- extinct in the wild, etc.

Threats to *Biodiversity*

- climate change review
- overfishing and overhunting review
- pollution review air, water, land and more...
- habitat loss: urban sprawl and deforestation review
 - example: palm oil plantations and Orangutans
 - monoculture vs polyculture* / natural systems review
- invasive* or “*invited*” species
 - distinguishing *invasive* and “*invited*” species
 - past causes: global trade, exotic animal trade and more...
 - future spread of *invasives* resulting from climate change
 - current threats from “*invited*” species
 - Burmese pythons
 - snakehead fish
 - feral hogs / boars
 - crayfish
 - eating *invasives*? ...great idea!

Q&A Intermission

Sustainable Wildlife Practices and Conservation Solutions

Opportunities and Success Stories

- coral reefs
- bison
- grey wolves
- eagles
- save the bees!
 - importance of pollinators (define and list varieties)
 - building beneficial bug homes for native pollinators
 - planting wildflowers

With Great Power Comes Great Responsibility...

- reconditioning our approach, from ownership to stewardship
- egocentric vs ecocentric*

“Rewilding” Ourselves

- cooperation before competition
- reconnecting with our a sense of place
- conservation through appreciation: sense of wonder

Debate and Q&A

- What is better for wildlife, allowing people in parks to inspire conservation or to keep humans away from wildlife areas?
- Is it ethical to keep animals in zoos?

9. LEADERSHIP TOOLKIT - How To Be A Sustainability Leader

Introduction

Acknowledging Universal Human Needs

- Maslow's "*hierarchy of needs*"
- poverty and *climate change*

Intersectionality

- considering race, gender, class and much more...
- true diversity: *inclusivity*
- social inequality: equality, *equity* and justice
- current social justice movements
- The Green New Deal: inspiration for comprehensive legislation

What Are Our Goals?: The Sustainability Model

- environmental sustainability
- a new economic model: a *circular economy*
- climate justice* is social justice

Q&A Intermission

Solutions for Leaders in Sustainability

Social Permaculture

- reason for being
 - "be the change you wish to see in the world"
 - use your talents to discover your life purpose
- small groups: friends and family
 - what you can do
 - podmapping*
 - "zones of trust"
- large groups: workplace and classroom
 - what you can suggest or implement as a group
 - human *polycultures*
 - "zone of cooperation"
- community: neighborhood or township
 - ways of working together
 - collective organizing for outside relations
 - town hall meetings
 - shared investments
 - facilitation tools

Effecting True Change

- beyond individual actions, we are more than consumers...
- what determines the pace of social change
 - public opinion, resource allocation and market exchange
 - improvements in governance and technology
 - changes in policy and regulations
 - final layer of social structure: cultural values

Protest and Social Movements

The Role of Art in Effecting Social Change

The Future Is Led By Our Youth!

- the importance of Indigenous perspectives
- Global Climate Strike

Be The Change

Debate and Q&A

- Which form of government is best for affecting change?
- Which individual action is best: Voting, striking, protest or...?
- Does your home or community use any renewable energy?
- What does your community need?

10. Course Overview, Group Discussion and Project Feedback