*Pass/Fail Grade*

**Syllabus**

**1. Course Information**

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| Title: | Climate Change and My Community |
| Course Number | NRM 595P, CRN / ED 595P, CRN |
| Credits: | 3 |
| Prerequisites: | Baccalaureate degree or approval of instructor |
| Location: | University of Alaska Fairbanks, 501 IARC/Akasofu Building and nearby field sites |
| Meeting Time: | 8:00 am – 7:00 pm |
| Date: | 10-14 June 2019 |

**2. Instructors:**

Dr. Elena Sparrow
203F Akasofu, UAF Main Campus
Office hours M-F (9 am – 6 pm)
907-474-7699
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Dr. Katie Spellman
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Ms. Malinda Chase
415 H Akasofu, UAF Main Campus
Office hours by appointment
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**Teaching Assistants:** Mrs. Christine Keill and Mrs. Christina Buffingtgon
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**3. Course Description:**

Climate change influences our lives in Alaska and the changes occurring in the Arctic impact the entire planet. The Arctic & Earth SIGNs: Climate Change In My Community course is for educators, youth group leaders, and/or community members interested in learning more about the impacts and feedbacks of a warming Arctic, braiding multiple ways of knowing and observing climate change from their elders, from satellites, and from their own observations, and making a difference on a climate change issue important to their community. You and the youth you work with will collaborate with University of

Alaska Fairbanks and NASA scientists to conduct an investigation using Global Learning and Observations to Benefit the Environment (GLOBE) citizen science protocols and inquiry learning methods and use these data, satellite data, and the knowledge of community elders to inform a climate change stewardship or adaptation project in the place you live. Taking this course will engage you in a project called Arctic and Earth STEM integrating GLOBE and NASA (SIGNs), which is funded through a cooperative agreement with NASA.

**4. Course Goals:**

- To enhance participants' awareness of the connection between climate change and their own lives.
- To increase their understanding of the impacts and feedbacks of a warming climate on Earth system from local to global scales using multiple ways of learning and knowing (traditional ecological knowledge, inquiry-based learning, scientific investigation, etc.).
- To increase participant ability to contribute to climate change science and problem solving in their own community through the use of GLOBE or other citizen science projects, NASA and UAF science assets, and collaboration with youth, other educators, community leaders, and scientists.

**5. Student Learning Outcomes:**

**By the end of the course, participants will have:**

- An increased awareness of social-ecological changes they have observed in their own lives, which are connected to climate change, and how climate change has affected the Arctic region and the rest of the world.
- An increased resource base for culturally responsive teaching of their students, youth groups, or communities about climate change, the process of science, and data literacy.
- An increased understanding of and ability to implement the range of protocols and approaches to designing an inquiry-based investigation to address climate change-related issues in their community (including indigenous and western science learning cycles, and GLOBE or other protocols for monitoring atmosphere, soils, land cover, plant phenology, hydrology, water quality, ice, soil active layer, permafrost, and berry availability).
- Worked with elders or community leaders and experts, NASA remotely sensed data, and other information sources to identify a primary climate change-related concern for their community that they and the youth they work with might be able to work on.
- Designed and implemented an investigation with youth or community members in collaboration with a scientist to address the identified issue, and applied the data to a community stewardship or climate change adaptation project.
- Presented their project to community leaders or at a science fair or symposium, such as

the GLOBE Regional Student Research Symposium, GLOBE Learning Expedition or GLOBE virtual science fair.

6. **Instructional Methods:** The intensive workshop will consist of lectures, field studies, discussions, and hands-on inquiry learning activities with support/ mentoring from instructors, elders, and scientist experts. The field implementation phase will consist of participants facilitating youth collaboration with community leaders, elders, and/or scientists to design and conduct a citizen science or GLOBE investigation that can help inform the community on a key climate change challenge. The students will apply their new knowledge to some sort of stewardship project to help address the issue and communicate their data and stewardship project back to community leaders in some way.

7. **Course Readings and Materials:**

**Texts:** GLOBE. 2014. The GLOBE Program Teacher's Guide. University Corporation for Atmospheric Research. Boulder, Colorado, USA. www.GLOBE.gov

Arctic Climate Impact Assessment. 2004. Impacts of a Warming Arctic: Arctic Climate Impact Assessment. ACIA Overview report. Cambridge University Press. 140 pp.

Association of Interior Native Educators. 2017. Culturally responsive curriculum guides. https://www.ainealaska.org/curriculum-resources

Sidney Stephens. 2003. Handbook for culturally responsive science curriculum. Alaska Science Consortium and Alaska Rural Systemic Initiative. Fairbanks, Alaska. http://ankn.uaf.edu/publications/handbook/handbook.pdf

Climate Literacy: The Essential Principles of Climate Science, A Guide for Individuals and Communities. 2009, second version. www.globalchange.gov

Earth Science Literacy Principles: The Big Ideas and Supporting Concepts of Earth Science.2010. www.earthscienceliteracy.org

**Course website:** arcticandearthsigns.org
**All materials for the course will be provided free of cost to the participants.**

8. **Course Calendar and Workshop Outline:**

**Pre-workshop Assignment:**
Causes of Climate Change 101 video
What is GLOBE?
Why Observing and Monitoring matters
**June 10 Homework**
GLOBE clouds e-training
Download GLOBE Observer App on phone

**June 11 Homework**
GLOBE Soils e-Training
Download the GLOBE Data Entry App
**June 13 evening**
Field Trip to Permafrost Tunnel with stop at pipeline
*Box Dinner Provided*
**June 14 Homework**
GLOBE hydrology eTraining

**Monday, June 10- Friday, June 14-** Climate Change and My Community Workshop on the UAF Main Campus (detailed workshop content outline below) starts the course.

**Monday, September 16-** Project implementation plan due

**Saturday, November 16, 10 AM, and/or Saturday January TBD** Participate in conference call for a mid-year project check-in.

**TBD-** Participate in a Meet-the-Scientist session with a NASA scientist investigating a similar topic as your students, youth group, or community.

**Tuesday, April 28-** Project implementation must be completed and presented to community

*Pass/Fail Grade*

## Climate Change and My Community Workshop Outline

| | Monday, June 10 | Tuesday, June 11 | Wednesday, June 12 | Thursday, June 13 | Friday, June 14 |
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| **Theme** | The Arctic is Changing and it has Personal to Global Implications;<br>(Everything is connected to everything else) | Weather and Climate Are Changing | The Ground Is Changing | Plant and Animals Are Changing (species shifts, invasives, fire, landcover, phenology, subsistence foods) | Water and Fish Habitats are Changing<br>(Rivers and lakes are changing: flooding, lake shrinkage, fish habitat) |
| **GLOBE protocol focus** | GPS, site set up | Atmosphere (temp and precip, clouds) | Pedosphere (Frost tube, soil moisture, permafrost thaw, erosion) | Biosphere (phenology, berries) | Hydrosphere (water quality-temperature, pH, dissolved oxygen, electrical conductivity, alkalinity, transparency macro-invertebrates) |
| **Inquiry Investigation Phase Focus** | Learning from Elders and Making observations | Generating questions | Designing an investigation and collecting data | Making Sense of Data & Sharing the Story | Bringing it all together communicating results |
| **Inquiry Learning/ Alaska Native Seasonal Learning Cycle Phase (cf. Stephens 2003) and daily activities** | | | | | |
| **Apply (Winter) Cultural expert shares knowledge** | - Sam Diementieff – AK Native Elder observations of change, dangerous ice conditions<br><br>Model how to do elder interviews | - Stanley Edwin Alaska Native scientist: Native and Western Science perspectives on clouds and atmosphere | - Elder Knowledge: Association of Interior Native Educators Curriculum units introduction- | - Alaska Interior Native Educators (AINE) plants units (Sample lessons from berry unit or medicinal plant unit)<br>- in the field with knowledge bearer on berries | Read Book "When will the Salmon Come?"<br>- AINE salmon unit (training in sample lessons and learning activities)<br>- Reflection from "the world is faster now |
| **Gear up (Spring) Assess prior knowledge, stretch muscles for skill and knowledge building** | - Sharing story maps of personal observations of environ change<br>- pre-assessment concept mapping of Arctic climate change<br>-Introduction to GLOBE and the Earth as a system concept<br>-What are inquiry and research?<br>-What makes a good investigation or community | -Using elder knowledge and satellite data to identify a key climate change challenge for your community<br>- exploration also using My NASA data | - soil songs<br>- Learn and practice GLOBE soils learning activities (to support science concept development)<br>- "Just passing through" activity | - Introduction to GLOBE & Winterberry phenology protocols (budburst, green-up and green-down); why they are important; effects of climate change on length of growing season & other seasonal events | - (training in sample lessons and learning activities) |

based monitoring program?

| | Monday, June 10 | Tuesday, June 11 | Wednesday, June 12 | Thursday, June 13 | Friday, June 14 |
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| **Explore (Summer)** Students explore phenomena, observe, record data, and develop skills and knowledge | -Why Monitor? -Need for protocols – Thermometer activity<br>-GLOBE Earth system poster<br>- Setting up a GLOBE monitoring site<br>- | - Learning activity on clouds;<br>-Atmosphere investigations and importance: current, minimum, maximum air temperature, cloud cover, types of clouds, precipitation (solid and liquid), pH of precipitation, surface temperature; understanding the difference between weather and climate | - Soils investigations in the field and importance: temperature (its relationship to ambient air temperature; impact of ground insulation and impact on vegetation), soil characterization, soil moisture<br>- feedbacks between permafrost and vegetation and climate change<br>- Practice designing a field study: collect systematic field data to address a research question of your own design using GLOBE protocols | -Do Learning Activities in the classroom<br>- Practice GLOBE phenology protocols and Winterberry protocol and GLOBE snowpack protocol during Field exploration; | - Smith Lake hydrology protocol exploration (water quality, macroinvertebrate sampling) |
| **Explain (Fall)** Make sense of explorations through data analysis and questioning | - Ways of knowing about climate change- and reflection on teaching practices | - Practice generating testable questions based on observations, elder knowledge and satellite data. first on clouds, then on an issue of local concern; share with group; | - Practice entering and visualizing data on GLOBE website<br>- Comparison of local soil moisture observations with SMAP satellite observations (validation investigation) | - Analyze data from field investigation and practice graphing results. | - Analyze data from Smith Lake investigation and draw conclusions. Communicate results and conclusion to the group. |
| **Apply (Winter)** Student applies and shares knowledge | - Can we monitor change or design an investigation that can help our community and also help with global climate research? How can we incorporate Western Science and Alaska Native knowledge? | - Overview of projects and implementation plan<br>- Examples from master educators who have used the Arctic and Earth SIGNs model | Work on project ideas and implementation plan | - Share 2 concrete examples of Data into Stewardship Action K-6 examples<br>-Work on project ideas and implementation plan | Present project ideas and implementation plan |

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| **Assess / Reflect (Winter)** Student reflects on experience | Pre-workshop/course assessment 2-minute write on focus question | 2-minute write on focus question | 2-minute write on focus question | 2-minute write on focus question | 2-minute write on focus question Post-workshop/course Assessment |
| **Lunch Guest Scientist and activity** | Dr. David Verbyla, Impacts of Climate Change in Alaska | - Stanley Edwin- Cloud Research in Alaska | - Dr. Kenji Yokishawa- Permafrost in our time<br>- Frost Tube protocol and tunnel man video | - Dr. Christa Mulder How does climate change affect berries? | Arctic Youth Round Table |

*Pass/Fail Grade*

9. **Course Policies:**
   - Punctuality and attendance at the workshop is expected. Absences may be excused for legitimate reasons e.g. sickness, time conflict with other required activities, etc.
   - Engaged participation and respect for instructors, guests and other participants, is expected, including closed laptops and stored digital devices unless being used as instructed for specific learning activities.
   - Plagiarism will not be tolerated and will result in failing grade being given to the student.

10. **Evaluation:** Letter grades will be based on absolute scores using the rubric below. Participation during the workshop and off-campus events as well as a report will be primary evaluation artifacts. Report will consist of the following: Description of project, evidence of collaboration with elders, community members and scientists; evidence of GLOBE protocol use for data collection and data entry on the GLOBE website; photos with permission documents; evidence of project communicated to community leaders/officials.

**Rubric for scoring a letter grade for NRM 595/ ED 595: Climate Change and My Community**

| Criteria | Score: 1 | Score: 2 | Score: 3 |
|---|---|---|---|
| Pre-workshop assignments | Did not do any assignments (Score:0) | Completed some or partially completed assignments | Completed all assignments |
| Workshop Attendance | Missed one or more full day(s) of the workshop | Missed part of one day of the workshop | Present for all days of the workshop |
| Workshop Participation | Engaged participation in <50% of workshop | Engaged participation in 50% to < 100% of workshop | Engaged participation in 100% of workshop |
| Workshop homework | Did not do required GLOBE e-training (Score:0) | Partially completed required GLOBE e- trainings | Completed all required GLOBE e-trainings |
| Off-campus Participation | No participation in Nov or Jan audio conference check-in (Score:0) | Participation in either Nov or Jan audio conference check-in but not both | Participation in both Nov and Jan audio conference check-in |
| Off-campus Participation | No participation in Meet-a-NASA scientist Google Hangouts session (Score:0) | | Participation in Meet-a-NASA scientist Google Hangouts session |
| Develop implementation plan | Did not develop a project plan or plan was submitted to instructors after 16 Sep 2019 | Developed an adequate project implementation plan, and submitted before 16 Sep 2019 | Developed a complete and well organized project implementation plan and submitted before 17 Sep 2018 |
| Collaboration with elders, community, and scientists | Little evidence of collaboration with elders or local knowledge holders, community members, and scientists to develop project and communicate results | Some evidence of collaboration with elders or local knowledge holders, community members, and scientists to develop project and communicate results | Strong collaboration with elders or local knowledge holders, community members, and scientists to develop project and communicate results |
| GLOBE Integration | Did not use any GLOBE measurement protocol (Score:0) | Used GLOBE protocol but did not enter data on GLOBE app or website | Used GLOBE protocol and entered all data on the GLOBE app or website |
| Workshop evaluation responses | No response or limited response to daily workshop reflection questions, and pre- and post- evaluations | Responded adequately to daily workshop reflection questions and pre- and post-evaluations | Responded to all evaluations in a thoughtful and complete manner and included more information than required |

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| Project Implementation | Did not implement their investigation and stewardship project by 28 April 2020 | Partially implemented their investigation and stewardship project by 28 April 2020 | Fully implemented their investigation and stewardship project by 28 April 2020 |
| Project Communication | No evidence submitted of project communication to local leaders and/or scientific community by 28 April 2020 | Project communicated one time or in one form to community leaders and/or scientific community by 28 April 2020 | Project communicated multiple times or in multiple forms to community leaders and/or scientific community by 28 April 2020 |
| Project Report Due 28 April 2020 | Submitted After April 28, 2020 (Score: 2) | Submitted on April 28, 2020 (Score:3) | Submitted Before April 28, 2020 (Score:4) |

Grades will be based on total points or scores. Most of criteria can have a total score ranging from 1 to 3, five range from 0 to 3, and one ranges from 2 to 4. The highest total score for the 13 criteria is 40.
Pass 40-29 Fail <28

**11. Support Services:** staff will be available for follow up support through emails, phone calls and, where possible, classroom visits.

**12. Disabilities Services:** The instructors will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities.