

# PROPOSAL FOR A CERTIFICATE PROGRAM

**Date:** August 27, 2024

**School/College/Unit:** Franklin College of Arts and Sciences

**Department/Division:** Department of Geography

**Certificate Title:** Climate Change Geographies

**Effective Term:** Fall 2025

**Which campus(es) will offer this certificate?** Athens

**Level (Undergraduate, Graduate, or Post-Baccalaureate):** Undergraduate

## **Program Abstract:**

The **Climate Change Geographies** certificate trains students for careers that address the varied challenges of climate change from local to global scales. Through the program's curriculum, students will advance their understanding of the social and natural processes of climate change and develop the knowledge and skills needed to tackle issues at the intersection of the physical and human dimensions of climate change. This program is rooted in expertise on climate change research and instruction within UGA's Department of Geography and expands broadly to provide connections with scientific, economic, and political fields of study across the UGA's campus. In completing the certificate, students will be prepared to apply an array of geographical and critical thinking skills to solve real-world problems aimed at contributing to a more just and sustainable future in a changing climate. The certificate requirements include two core courses on the physical and human geographies of climate change, one Geography elective selected from an array of topics to be tailored to the student's needs, and one elective from a list of those available across campus to broaden the student's perspective (12 total credit hours). Students will also participate in an annual knowledge and cohort building event with the certificate coordinator from the year they declare the certificate until the year of graduation that includes a written assessment examining the program's learning outcomes and integration of the student's knowledge across courses.

## **Certificates Offered By One Academic Unit**

### **1. Purpose and Educational Objectives**

The discipline of Geography has a long-established engagement with climate and climate change studies spanning physical, social, and technological aspects of the issue. Building on this knowledge base, the Climate Change Geographies certificate provides students with key competencies for careers requiring an integrative understanding of climate change. This includes knowledge of the physical and social processes that cause climate change, the impacts of climate change at multiple spatial and temporal scales, mitigation and adaptation responses to climate change, and considerations for fairness and equity in climate policy. The certificate curriculum is relevant for those seeking climate change credentials for careers in climate and environmental science, environmental policymaking, resource conservation, urban planning, climate finance, weather/disaster emergency response, non-profit work, and more. While anchored in Geography, the curriculum will be accessible for students in other majors who have completed their general educational requirements. Students will also have the opportunity to take an elective from other units on campus, in addition to taking three required Geography courses.

### **2. Need for the Program**

Climate Change poses serious challenges to both natural and social systems. Extreme weather events caused by climate change—such as droughts, floods, storms, heat waves, and hurricanes—threaten agricultural productivity, life in cities and coastal areas, natural resource management, and human health. Nearly all sectors of social and economic activity need to adapt to a changing climate, and policies to both mitigate the causes of climate change and adapt to its impacts are increasingly needed in governance at all scales. This certificate will be the first program directly centered on climate change at UGA, offering students the opportunity to gain credentials in this important area of inquiry. This certificate equips students with the skills needed to pursue a variety of careers directly and indirectly related to a changing climate, including, but not limited to: climatologist, environmental lawyer, conservation scientist, environmental engineer, sustainability consultant, natural disaster response manager, logistics manager, climate policy coordinator, civil service, government official, educator, public health officers, and non-governmental organization (NGO) employee.

It is also important that UGA develop educational opportunities in critical areas of social and environmental education to maintain and improve our status among peer and aspirational institutions (more on this in section 5 below). The proposed Climate Change Geographies certificate will help UGA keep pace with emerging educational and career trends in the field, while also consolidating a well-established curriculum on the environmental and social dimensions of climate change that already exists in the Department of Geography and is taught by nationally and internationally known faculty in the field. The certificate is designed to connect teaching and research strengths in Geography, strengthen ties with the growing Atmospheric Sciences undergraduate degree, and enhance interdisciplinary connections across campus. While there are other units and programs that include climate change in their general curriculum, this is the first program to directly focus on and consolidate existing classes in climate change at UGA.

- a. Semester/Year of Program Initiation: Fall 2025
- b. Semester/Year of Full Implementation of Program: Fall 2025
- c. Semester/Year First Certificates will be awarded: Fall 2025. We have some students who could graduate with this certificate as soon as it is created. Faculty and advisors have been steering students in ATSC and GEOG who are interested in climate change to this suite of classes already.
- d. Annual Number of Graduates expected (once the program is established): Based on student survey data, we expect the annual number of certificate graduates to be at least **38** once the program has been established and in existence long enough for students to have time to take the classes before graduating (by 2027). We also anticipate this number to increase over time.
- e. Projected Future Trends for number of students enrolled in the program: Based on student survey data and a very conservative estimate of interest (i.e., only 37.5% of Geography/Atmospheric Sciences majors ultimately enrolling, vs. survey results indicating closer to 75%; see Section 3 below), we project at least the following:

	2025-26	2026-27	2027-28	2028-29	2029-30
Enrollment	28	33	38	43	48

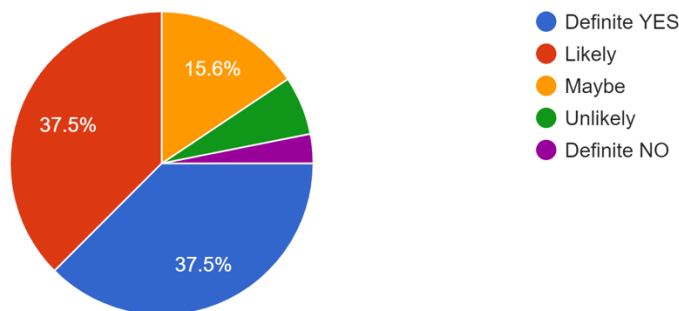
### 3. Student Demand

- a. Provide documentation of evidence of student demand for this program, including a student survey

A survey of student interest was shared with Atmospheric Sciences and Geography majors in February 2024. 32 responses were received. Of these, 75% of students stated that they would be a “definite YES” or “likely” to pursue this certificate:

1. If the Geography Dept. created a new 4-course certificate in climate entitled " Geographies of Climate Change" (or similar wording) how interested would you be in pursuing such a certificate?

32 responses



b. Provide evidence that demand will be sufficient to sustain reasonable enrollment.

The Department of Geography is home to three majors that already exhibit demand for this certificate: a **B.S. in Atmospheric Sciences**, a **B.S. in Geography**, and an **A.B. in Geography**. Atmospheric sciences majors, which are one of the prime targets of this certificate, have totaled over 50 majors for the past four years. This major's focus on meteorology is highly compatible with a certificate on climate change and students in this major have been requesting a climate-focused certificate option for several years. The number of ATSC majors in Fall 2024 is 75 students. If just 37.5% of these students pursue the certificate, this would lead to a certificate enrollment of 28 students—and this is a very conservative estimate of interest. Similarly, B.S. students in Geography focus on various aspects of environmental change that often have direct relationship to climate change, while our A.B. students often focus on how climate change impacts are differentiated by race, class, and gender. Questions of climate change science and policy are already part of many of the classes offered by Geography (as listed in the program of study below) in line with our discipline's strengths and interest among our majors, making demand for this certificate significant in our department.

We also expect that students in units and majors across campus will also be a source of demand for the certificate, as many career options exist across various disciplines. This includes students across the **Franklin College of Arts and Sciences** (e.g. Anthropology, Computing, Geology, History, Marine Sciences), as well as the **Odum School of Ecology**, the **College of Agricultural and Environmental Sciences**, and the Environmental Health Sciences Major in the **College Public Health** (all of whom have electives as options in our Program of Study, approvals included at the end of this document), and the **Warnell School of Forestry**. Demand for this certificate will be distinct from the Interdisciplinary Certificate in Sustainability because this program is explicitly focused on climate change, where all courses in the program of study include at least 50% of their curriculum focused on climate change science and/or policy. This certificate offers students credentials specifically in climate change as part of their degree, which is in high demand among many students for their career goals.

c. To what extent will minority student enrollments be greater than, less than, or equivalent to the proportion of minority students in the total student body?

We expect to draw students from Geography B.S. and A.B. programs, the Atmospheric Sciences B.S. Major (housed in Geography), and across campus in related fields. Demographics for the Geography B.S./A.B. generally track with UGA demographics, and we expect the same for students from these programs who enroll in this certificate. The Atmospheric Sciences major in the Geography Department has a higher percentage of minority students than the UGA student body. UGA institutional data on diversity for Fall 2021 showed that the Atmospheric Sciences major was 59% women and 24% non-white, including 17% Black or African American or two or more races. These numbers make the UGA Atmospheric Sciences program one of the most diverse in the United States, and we expect this to transfer to the Climate Change Geographies certificate enrollment for students from this major.

## 4. Program of Study

This is a 12-hour curriculum, designed to efficiently and effectively expose students to the social and physical aspects of climate change, centering a geographic perspective. Through two electives, students can tailor their focus with the help of the certificate coordinator.

### 1) Students must take one physical science course (3 hours):

GEOG 3110 Climatology

OR

GEOG/ATSC 3180 Global Climate Change: Causes and Consequence

### 2) Students must take one social / policy course (3 hours):

GEOG 3185 Climate Change Solutions

OR

GEOG 3670 Geographies of Climate Justice

### 3) Students must take one GEOG/ATSC elective (3 hours):

ATSC (GEOG) 4140 Satellite Climatology/Meteorology

ATSC (GEOG) 4150 Physical Climatology

ATSC (GEOG) 4155 Hydrometeorology

ATSC (GEOG) 4160 Applied Climatology in the Urban Environment

ATSC (GEOG) 4161 Microclimatology

GEOG 3110 Climatology *\*If not chosen for #1 above*

GEOG 3180 Global Climate Change: Causes and Consequences *\*If not chosen for #1 above*

GEOG 3185 Climate Change Solutions *\*If not chosen for #2 above*

GEOG 3670 Geographies of Climate Justice *\*If not chosen for #2 above*

GEOG 4040 Global Environmental Change

GEOG 4180 Special Topics in Atmospheric Sciences

### 4) Students must take a second elective (3 hours, does not have to be GEOG, but can be)

All courses listed above not already taken in 1), 2), or 3), plus:

AAEC 3050 Climate Change Economics and Policy

ANTH 3090 Past Peoples, Present Climates

ANTH 4305 Introduction to Dendrochronology

CLAS 4190 Climate and Catastrophes in Antiquity

ECOL 4120H Ecology of Global Climate Change (Honors)

EHSC 4200	Global Climate Change and Public Health
GEOL 4940L	Volcanology
HIST 4442	History of Oil
MARS/MATH 4730	Mathematics and Climate
WMST 4770	Women, Gender, and Climate Justice

**Note on Electives:** Criteria for inclusion is that the course must be at the **3000 or 4000 level** and have a significant component focusing on climate change, or climate as it relates to climate change (**50% or more**). This provides rigorous and comprehensive training, but in an efficient and focused format. We reviewed all courses in the catalog with the term “climate change” and reached out to the corresponding departments, soliciting that course or any other that satisfies the above requirement. The list above is what we received in response. Additional courses can be added to this list. The certificate coordinator will review courses submitted for consideration once a semester and add them to the list of approved electives as appropriate.

**5) Students must participate in an annual knowledge and cohort building event:**

The coordinator of the certificate will be responsible for organizing a presentation, colloquium, workshop, and/or brown bag event every year to create a cohort feel. Students will submit a written assignment associated with the event and the program’s learning objectives to receive credit for attendance.

**5. Model Program and Accreditation**

a. Identify any model programs, accepted disciplinary standards, and accepted curricular practices against which the proposed program could be judged. Evaluate the extent to which the proposed curriculum is consistent with these external points of reference and provide a rationale for significant inconsistencies and differences that may exist.

The external program that is most similar to this Climate Change Geographies Certificate is the Climate Change Studies Minor offered by *Scripps Institution of Oceanography* (a leading center for global Earth science research and education in the world) at the *University of California, San Diego* (<https://scripps.ucsd.edu/undergrad/curriculum/climate-change-studies-minor>). Like our certificate, this minor program aims to build “*understanding of the scientific, social, political and economic dimensions of climate change.*” Since the Scripps Institution of Oceanography program is a minor rather than a certificate and the University of California and San Diego is on the quarter system, the number of courses required is not directly comparable to ours, but the content and training is equivalent. Their program requirements include: (1) a course on climate change solutions, (2) two courses on social and human dimensions of climate change, (3) two courses on understanding the science of climate change, and (4) a practicum course related to climate change research and/or independent study. Similarly, our certificate requirements include a required courses on solutions and human dimensions of climate change (i.e., GEOG 3185: Climate Change Solutions or GEOG 3670: Geographies of Climate Justice), a course on the

physical science of climate change (i.e., GEOG 3110: Climatology or GEOG 3180: Global Climate Change: Causes and Consequences), and annual participation in seminars and activities with the certificate coordinator. Two required electives will enhance the student's training in physical and/or social dimensions of climate change in ways that they can tailor it to their own needs and career aspirations. As such, there are no significant inconsistencies between the two programs.

In addition, there are a growing number of similar programs at peer and aspirational institutions across the country, including:

- **Climate Science and Solutions Certificate at Yale University**  
(<https://catalog.yale.edu/ycps/subjects-of-instruction/climate-science-and-solutions>)
- **Environmental Changemakers Certificate at the University of California, Irvine**  
(<https://students.soceco.uci.edu/pages/environmental-changemakers-certificate>)
- **Climate Change Certificate at San Francisco State University**  
(<https://climatehq.sfsu.edu/climatehq/climate-change-certificate-1>)
- **Climate Change Certificate at the University of Utah**  
([https://geog.utah.edu/\\_resources/documents/geog-climate-change-cert-requirements.pdf](https://geog.utah.edu/_resources/documents/geog-climate-change-cert-requirements.pdf))
- **Climate Change Minor at Georgia Institute of Technology**  
(<https://eas.gatech.edu/climate-change-minor>)

Note: The GA Tech minor is for *non-majors* in earth or atmospheric sciences. This Climate Change Geographies certificate is designed for students in Atmospheric Science and Geography who do obtain a depth of study in the sciences, but is also accessible to students in other majors.

- **Climate Change Minor at Cornell University**  
(<https://www.eas.cornell.edu/eas/programs/undergraduate-programs/undergraduate-minors/climate-change-minor>)
- **Climate Change Minor at Texas A&M**  
(<https://artsci.tamu.edu/academics/degrees/minors/climate-change-minor.html>)

Many of these programs have been created in the last 5-10 years, indicating that this certificate will be at the forefront of this growing effort and there is substantial interest from current undergraduate students. The aim to provide training and education in climate change across physical and social domains, with an emphasis on solutions, is consistent across all these programs, as well as the one proposed here. This certificate's curriculum requirements are equal to the disciplinary standards and curricular practices of these similar programs and there are no significant inconsistencies.

b. If program accreditation is available, provide an analysis of the ability of the program to satisfy the curricular standards of such specialized accreditation.

Not applicable

## 6. Student Learning Outcomes

- Students will learn the fundamentals of climate change science and prediction at various spatial and temporal scales.
- Students will demonstrate integrated understanding of the Earth’s climate system, including links between the atmosphere, hydrosphere, geosphere, biosphere, and social systems.
- Students will learn about climate policy/action and climate change governing institutions and be able to use critical thinking skills to evaluate various benefits and drawbacks to different approaches.
- Students will acquire critical thinking to evaluate a range of claims about climate change, its causes, its solutions, and the context for discussions around climate change mitigation and adaptation.
- Students will learn communication and collaboration skills to apply their knowledge to real-world climate problems and engage with multiple stakeholders.

## 7. Assessment and Admissions

Describe how the learning outcomes for the program will be assessed. Describe the process and criteria for how students will be admitted to and retained in the program.

Learning Outcome	Program Assessment
1. Fundamentals of climate change science and prediction at various scales.	<p>Anonymous survey of seniors/alums of certificate.</p> <p>Observations by faculty teaching core classes and communication with the certificate coordinator at least annually.</p> <p>Exams and assignments in required physical science course (GEOG 3110 and/or GEOG/ATSC 3180).</p>
2. Integrated understanding of the earth’s climate system from socio-environmental perspective.	<p>Anonymous survey of seniors/alums of certificate.</p> <p>Observations by faculty teaching core classes and communication with the certificate coordinator at least annually.</p> <p>Discussions between students and the certificate coordinator about electives and how courses target learning and careers goals.</p> <p>Exams and assignments in required physical science course (GEOG 3110 and/or GEOG/ATSC 3180).</p>

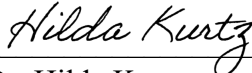


<p>3. Critical thinking skills to understand climate policy/action and evaluate different approaches.</p>	<p>Exams and assignments in required social science course GEOG 3185 and/or GEOG 3670.</p> <p>Participation in class activities designed to mimic real world climate policy debates in GEOG 3185 and/or GEOG 3670.</p> <p>Demonstrate connections across all certificate courses during an annual knowledge and cohort building event.</p>
<p>4. Evaluate claims about climate change and discussions of climate change mitigation and adaptation.</p>	<p>Exams and assignments in required social science course GEOG 3185 and/or GEOG 3670</p> <p>Final projects and/or exams in core and elective courses.</p> <p>Observations by faculty teaching core classes and communication with the certificate coordinator at least annually.</p>
<p>5. Communicate and collaborate to apply knowledge to real-world climate problems and engage with multiple stakeholders.</p>	<p>Participation in an annual knowledge and cohort building event.</p> <p>Communication with faculty and units teaching electives to assess student performance.</p> <p>Interviews and surveys with students after graduation.</p>

**Admission** to the program will occur on a rolling basis and requires that students submit an online application managed by the Department of Geography. They must be in good academic standing and have completed or received credit for at least 24 hours of instruction at the time they apply. Students are prepared for the certificate’s core required courses through UGA’s general education core curriculum and students must maintain a 3.0 average in all certificate classes.

We will support **retention** in the program through the annual knowledge and cohort building event, where the certificate coordinator will engage directly with students on what they are learning, what is working, and any challenges they are encountering. The certificate coordinator will also conduct annual surveys with students, faculty, and alumni of the program.

**Approved by Department of Geography Faculty Vote 22-0-0 on 9/4/24**

  
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 Dr. Hilda Kurtz  
 Professor and Head  
 Department of Geography

**Approvals from Heads of Units with Courses on the Program of Study (Electives)**

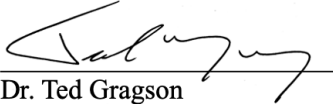
The signature below confirms approval that course AAEC 3050 (Climate Change Economics and Policy) be included as an elective option in the proposed Climate Change Geographies Certificate.



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Dr. Gregory Colson  
Interim Department Head, Interim CAED Director, Professor  
Agriculture & Applied Economics

The signature below confirms approval that courses ANTH 3090 (Past Peoples, Present Climates) and ANTH 4305 (Introduction to Dendrochronology) be included as elective options in the proposed Climate Change Geographies Certificate.



Dr. Ted Gragson  
Department Head, Professor  
Anthropology

The signature below confirms approval that CLAS 4190 (Climate and Catastrophes in Antiquity) be included as an elective option in the proposed Climate Change Geographies Certificate.



9/16/2024

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Dr. Mario Erasmo  
Department Head, Professor  
Classics

The signature below confirms approval that the course EHSC 4200 (Global Climate Change and Public Health) be included as an elective option in the proposed Climate Change Geographies Certificate.



Erin K Lipp, PhD, Associate Dean for Academic Affairs, College of Public Health

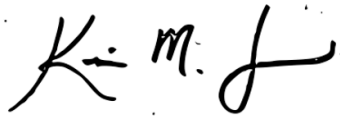
The signature below confirms approval that the course GEOL 4940L (Volcanology) be included as an elective option in the proposed Climate Change Geographies Certificate.



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Dr. Adam Milewski  
Professor and Department Head, Geology

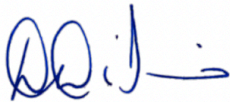
The signature below confirms approval that the course HIST 4442 (History of Oil) be included as an elective option in the proposed Climate Change Geographies Certificate.



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Kevin Jones  
Associate Professor, Department Head

The signature below confirms approval that the course MARS/MATH 4730 (Mathematics and Climate) be included as an elective option in the proposed Climate Change Geographies Certificate.



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Daniela Di Iorio  
Department Head and Professor  
Marine Sciences

The signature below confirms approval that the course WMST 4770 (Women, Gender, and Climate Justice) be included as an elective option in the proposed Climate Change Geographies Certificate.



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Patricia Richards  
Director and Professor  
Institute for Women's Studies



September 12, 2024

Dr. Jennifer Rice  
Department of Geography  
University of Georgia

Dear Dr. Rice:

The Odum School of Ecology is pleased to support the proposed undergraduate certificate Climate Change Geographies. We offer the following elective to count towards the Certificate:

ECOL 4120H Ecology of Global Climate Change Honors

We at the Odum School appreciate the opportunity to contribute to interdisciplinary education and workforce development to meet important societal challenges while increasing environmental and social resiliency. We fully support using our course as an elective and look forward to future collaborations.

Sincerely,

A handwritten signature in black ink, appearing to read "Rohani".

Pejman Rohani  
Associate Dean for Academic Affairs, Odum School of Ecology  
Regents' Professor  
UGA Athletics Association Professor  
Deputy Director, Center for Influenza Disease & Emergence Research