



University Council

January 10, 2025

UNIVERSITY CURRICULUM COMMITTEE – 2024-2025

Susan Sanchez, Chair

Agricultural and Environmental Sciences – Kylee Duberstein

Arts and Sciences – Casie LeGette (Arts)

Paula Lemons (Sciences)

Business – Karen Aguar

Ecology – Amanda Rugenski

Education – Amy Murphy

Engineering – David Stooksbury

Environment and Design – Katherine Melcher

Family and Consumer Sciences – Melissa Landers-Potts

Forestry and Natural Resources – Richard Chandler

Journalism and Mass Communication – Yan Jin

Law – Joe Miller

Pharmacy – Michelle McElhannon

Public and International Affairs – Ryan Powers

Public Health – Tamora Callands

Social Work – Jennifer Elkins

Veterinary Medicine – Paul Eubig

Graduate School – Rodney Mauricio

Ex-Officio – Provost S. Jack Hu

Undergraduate Student Representative – Ella Colker

Graduate Student Representative – William Walker

Dear Colleagues:

The attached proposal from the Franklin College of Arts and Sciences for an Undergraduate Certificate in Climate Change Geographies will be an agenda item for the January 17, 2025, Full University Curriculum Committee meeting.

Sincerely,

Susan Sanchez, Chair

cc: Provost S. Jack Hu

Dr. Marisa Pagnattaro

# PROPOSAL FOR A CERTIFICATE PROGRAM

**Date:** August 27, 2024

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

**Department/Division:** Geography

**Certificate Title:** Climate Change Geographies

**CIP:** 30350100

**Effective Term:** Fall 2025

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

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

## **Program Abstract:**

The Undergraduate Certificate in Climate Change Geographies 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 tailored to the student's needs, and one elective from a list of those available across campus to broaden the student's perspective, for a total of 12 credit hours. Students will also be required to 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.

## 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 Undergraduate Certificate in Climate Change Geographies 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 and 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 at least 24 hours of UGA's general educational core curriculum requirements in any area. 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 servant, government official, educator, public health officer, and non-governmental organization (NGO) employee. Specifically, the Bureau of Labor Statistics projects the following job growth numbers from 2023 to 2033: 7% for environmental scientists and specialists,<sup>1</sup> 6% for atmospheric scientists,<sup>2</sup> and 4% for emergency management.<sup>3</sup>

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. The proposed Undergraduate Certificate in Climate Change Geographies 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

---

<sup>1</sup> <https://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm#:~:text=in%20May%202023.,Job%20Outlook,on%20average%2C%20over%20the%20decade>

<sup>2</sup> <https://www.bls.gov/ooh/life-physical-and-social-science/atmospheric-scientists-including-meteorologists.htm>

<sup>3</sup> <https://www.bls.gov/ooh/management/emergency-management-directors.htm#:~:text=in%20May%202023.,Job%20Outlook,the%20average%20for%20all%20occupations>

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 (B.S.), 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
- d. Annual Number of Graduates expected (once the program is established): Based on student survey data, the faculty expect the annual number of certificate graduates to be at least **28** once the program has been established. The faculty 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 (A.B., B.S.) and Atmospheric Sciences (B.S.) majors ultimately enrolling, vs. survey results indicating closer to 75%, the faculty project at least the following:

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

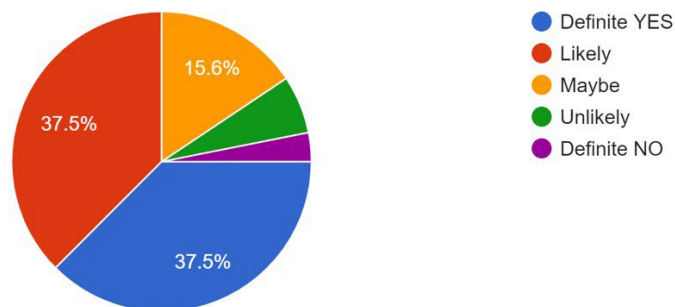
### 3. Student Demand

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 (B.S.) and Geography (A.B., B.S.) 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. The certificate is expected to be especially appealing to students in the Atmospheric Sciences major, which has had over 50 graduates in the last four years and has a current enrollment of over 75 students. The Bachelor of Science (B.S.) degree in Atmospheric Sciences has a focus on meteorology which is highly compatible with a certificate in climate change. Students in this major have been requesting a climate-focused certificate option for several years. If just 37.5% of these students pursue the certificate, this would lead to a certificate enrollment of 28 students. This is a very conservative estimate of interest. Similarly, Geography (B.S.) students focus on various aspects of environmental change that often have a direct relationship to climate change, while Geography (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 the Geography department in line with the discipline's strengths and interest among students, making demand for this certificate significant.

The department also expects that students in units and majors across campus will also be interested in pursuing the certificate, as many relevant 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), the Odum School of Ecology, the College of Agricultural and Environmental Sciences, the College Public Health, and the Warnell School of Forestry and Natural Resources. Demand for this certificate will be distinct from the Undergraduate Certificate in Sustainability because this program is explicitly focused on climate change. All courses in the program of study include at least 50% of their curriculum focused on climate change science or policy. This certificate offers students a credential specifically in climate change, which is in high demand among many students for their career goals.

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

The department expects to draw students from Geography (B.S.), Geography (A.B.), Atmospheric Sciences (B.S.), and from across campus in related fields. Demographics for the Geography (B.S.) and Geography (A.B.) programs generally track with UGA demographics. The Atmospheric Sciences (B.S.) 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 (B.S.) major was 59% women and 24% non-white, including 17% Black or African American or two or more races. The department expects these demographics will be reflected in the certificate enrollment.

#### **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) Choose one physical science course (3 hours):**

ATSC(GEOG) 3110, Climatology (3 hours)  
GEOG(ATSC) 3180, Global Climate Change: Causes and Consequences (3 hours)

##### **2) Choose one social or policy course (3 hours):**

GEOG 3185, Climate Change Solutions (3 hours)  
GEOG 3670, Geographies of Climate Justice (3 hours)

##### **3) Choose one ATSC or GEOG elective (3 hours):**

ATSC(GEOG) 3110, Climatology (3 hours)  
ATSC(GEOG) 4140/6140, Satellite Meteorology and Climatology (3 hours)  
ATSC(GEOG) 4150/6150, Physical Climatology (3 hours)  
ATSC(GEOG) 4155/6155, Hydrometeorology (3 hours)  
ATSC(GEOG) 4160/6160, Applied Climatology in the Urban Environment (3 hours)  
ENGR(ATSC)(GEOG) 4161/6161-4161L/6161L, Environmental Microclimatology (3 hours)  
ENGR(GEOG) 4180/6180, Special Topics in Atmospheric Sciences (3 hours)  
GEOG(ATSC) 3180, Global Climate Change: Causes and Consequences (3 hours)  
GEOG 3185, Climate Change Solutions (3 hours)  
GEOG 3670, Geographies of Climate Justice (3 hours)  
GEOG 4040/6040, Global Environmental Change Past and Present (3 hours)

##### **4) Choose a second elective course (3 hours):**

AAEC 3050, Climate Change Economics and Policy (3 hours)  
ANTH 3090, Past Peoples, Present Climates (3 hours)  
ANTH 4035/6035, Introduction to Dendrochronology (3 hours)  
ATSC(GEOG) 3110, Climatology (3 hours)  
ATSC(GEOG) 4140/6140, Satellite Meteorology and Climatology (3 hours)  
ATSC(GEOG) 4150/6150, Physical Climatology (3 hours)  
ATSC(GEOG) 4155/6155, Hydrometeorology (3 hours)  
ATSC(GEOG) 4160/6160, Applied Climatology in the Urban Environment (3 hours)  
CLAS 4190/6190, Climate Change and Catastrophes in Antiquity (3 hours)  
ECOL 4120H, Ecology of Global Climate Change (Honors) (3 hours)

EHSC 4200, Global Climate Change and Public Health (3 hours)  
ENGR(ATSC)(GEOG) 4161/6161-4161L/6161L, Environmental Microclimatology (3 hours)  
ENGR(GEOG) 4180/6180, Special Topics in Atmospheric Sciences (3 hours)  
GEOG(ATSC) 3180, Global Climate Change: Causes and Consequences (3 hours)  
GEOG 3185, Climate Change Solutions  
GEOG 3670, Geographies of Climate Justice (3 hours)  
GEOG 4040/6040, Global Environmental Change Past and Present (3 hours)  
GEOL 4940L/6940L, Volcanology (3 hours)  
HIST 4442/6442, The History of Oil: Energy, Labor, and Politics (3 hours)  
MATH(MARS) 4730/6730, Mathematics of Climate (3 hours)  
WMST 4770/6770, Women, Gender, and Climate Justice (3 hours)

Criteria for inclusion as an elective in the program of study 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. Additional courses will be added to this list in the future. 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, or brown bag event every spring semester to create a cohort dynamic. All enrolled students will be required to attend the event for every spring semester they are enrolled. Topics of the event can include, for example: state of the science and/or policy presentations from industry experts, meetings with certificate alumni, and/or workshops with non-profit and government officials relevant to careers in climate change. Students will submit a written assignment associated with the event and the program's learning objectives to receive credit for attendance. The certificate coordinator will be responsible for tracking/ensuring completion of the requirement using a non-course requirement in DegreeWorks.

### **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 the proposed Undergraduate Certificate in Climate Change Geographies is the Minor in Climate Change Studies offered by the Scripps Institution of Oceanography, a leading center for global Earth science research and education in the world, at the University of California, San Diego. Like the proposed certificate, this minor 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 the proposed certificate, 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 or independent study. Similarly, the proposed certificate requirements include a required course on solutions and human dimensions of climate change, a course on the physical science of climate change, and annual participation in seminars and activities with the certificate coordinator. Two required electives will enhance the student's training in the physical and social dimensions of climate change in ways that they can tailor it to their own needs and career aspirations.

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

- Certificate in Climate Science and Solutions, Yale University
- Certificate in Environmental Changemakers Certificate, University of California, Irvine
- Certificate in Climate Change, San Francisco State University
- Certificate in Climate Change, University of Utah
- Minor in Climate Change, Georgia Institute of Technology
- Minor in Climate Change, Cornell University
- Minor in Climate Change, Texas A&M University

Many of these programs have been created in the last 5-10 years, indicating that the proposed 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 at UGA. 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**

- LO1: Students will learn the fundamentals of climate change science and prediction at various spatial and temporal scales.
- LO2: Students will demonstrate integrated understanding of the Earth's climate system, including links between the atmosphere, hydrosphere, geosphere, biosphere, and social systems.



- LO3: 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.
- LO4: 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.
- LO5: 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
LO1. Fundamentals of climate change science and prediction at various scales.	<p>Anonymous survey of fourth-year students and alumni.</p> <p>Observations by faculty teaching core classes and annual communication with the certificate coordinator.</p> <p>Exams and assignments in required physical science course (GEOG 3110 and/or GEOG/ATSC 3180).</p> <p>Assignments and activities in electives courses: ATSC/GEOG 4150, ATSC/GEOG 4155, ENGR(ATSC)(GEOG) 4161/4161-L, MATH(MARS) 4730, ECOL 4120H</p>
LO2. Integrated understanding of the earth's climate system from socio-environmental perspective.	<p>Anonymous survey of fourth-year students and alumni.</p> <p>Observations by faculty teaching core classes and annual communication with the certificate coordinator.</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>Assignments and activities in electives courses: ATSC/GEOG 4140, ATSC/GEOG 4160, GEOG 4040, ANTH 3090, ANTH 4035</p>

<p>LO3. 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 (GEOG 3185 and/or GEOG 3670.)</p> <p>Demonstration of connections across all certificate courses during an annual knowledge and cohort building event.</p>
<p>LO4. 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. Observations by faculty teaching core classes and annual communication with the certificate coordinator.</p> <p>Assignments and activities in electives courses: AAEC 3050, CLAS 4190, EHSC 4200, GEOL 4940L, HIST 4442, WMST 4770</p>
<p>LO5. 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. Applicants must be in good academic standing and have completed or received credit for at least 24 hours of UGA’s General Education Core Curriculum at the time of application. Students must earn an average of “B” (3.0) in all certificate classes to be awarded the certificate.

The department 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.

## Documentation of Approval and Notification

**Proposal:** Undergraduate Certificate in Climate Change Geographies

**College:** Franklin College of Arts and Sciences

**Departments:** Geography

**Proposed Effective Term:** Fall 2025

### School/College:

- Department of Geography Department Head, Dr. Hilda Kurtz, 8/27/2024
- Franklin College of Arts and Sciences Associate Dean, Dr. Paula Lemons, 10/18/2024

### Use of Course:

- Department of Agriculture and Applied Economics Interim Department Head, Dr. Gregory Colson, 8/27/2024
- Department of Anthropology Department Head, Dr. Ted Gragson, 8/27/2024
- Department of Classics Department Head, Dr. Mario Erasmo, 8/27/2024
- College of Public Health Associate Dean, Dr. Erin Lipp, 8/27/2024
- Department of Geology Department Head, Dr. Adam Milewski, 8/27/2024
- Department of History Department Head, Dr. Kevin Jones, 8/27/2024
- Department of Marine Sciences Department Head, Dr. Daniela Di Iorio, 8/27/2024
- Institute for Women's Studies Director, Dr. Patricia Richards, 8/27/2024
- Odum School of Ecology Associate Dean, Dr. Pejman Rohani, 8/27/2024