

March 11, 2011

Dean Lisa J. Graumlich  
College of the Environment  
Box 355679

Dear Lisa:

Based on the recommendation of its Subcommittee on Admissions and Programs, the Faculty Council on Academic Standards has recommended approval of a minor in Climate Science. A copy of the changes is attached.

I am writing to inform you that the College of the Environment is authorized to specify these requirements beginning winter quarter 2011.

The new requirements should be incorporated in printed statements and in individual department websites as soon as possible. The *General Catalog* website will be updated accordingly by the Registrar's Office.

Sincerely yours,



Phyllis M. Wise  
Interim President

Enclosure

cc: Dr. LuAnne Thompson (with enclosure)  
Mr. Robert Corbett (with enclosure)  
Dr. Deborah H. Wiegand (with enclosure)  
Ms. Virjean Edwards (with enclosure COENV-20100714)  
Ms. Michelle Hall (with enclosure)

AUG 10 2010

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UNIVERSITY OF WASHINGTON

# CREATING AND CHANGING UNDERGRADUATE ACADEMIC PROGRAMS

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COENN - 201007M

After college/school/campus review, send a signed original and 8 copies to the Curriculum Office/FCAS, Box 355850.

For information about when and how to use this form: <http://depts.washington.edu/uwcr/1503instructions.pdf>

<b>College/Campus</b> College of the Environment/UW Seattle	<b>Department/Unit</b> School of Oceanography, Dept. of Earth and Space Science and Atmospheric Science, Program on Climate Change	<b>Date</b> July 14, 2010
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### New Programs

- Leading to a Bachelor of \_\_\_\_\_ in \_\_\_\_\_ degree.
- Leading to a Bachelor of \_\_\_\_\_ degree with a major in \_\_\_\_\_.
- Leading to a \_\_\_\_\_ Option within the existing major in \_\_\_\_\_.
- Leading to a minor in Climate Science

### Changes to Existing Programs

- New Admission Requirements for the Major in \_\_\_\_\_ within the Bachelor of \_\_\_\_\_.
- Revised Admission Requirements for the Major in \_\_\_\_\_ within the Bachelor of \_\_\_\_\_.
- Revised Program Requirements for the Major in \_\_\_\_\_ within the Bachelor of \_\_\_\_\_.
- Revised Requirements for the Option in \_\_\_\_\_ within the major in \_\_\_\_\_.
- Revised Requirements for the Minor in \_\_\_\_\_.

### Other Changes

- Change name of program from \_\_\_\_\_ to \_\_\_\_\_.
- New or Revised Continuation Policy for \_\_\_\_\_.
- Eliminate program in \_\_\_\_\_.

Proposed Effective Date: **Quarter:**  Autumn  Winter  Spring  Summer **Year: 20 11**

Contact Person: LuAnne Thompson	Phone: x39965	Email: luanne@uw.edu	Box: 355351
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### EXPLANATION OF AND RATIONALE FOR PROPOSED CHANGE

For new program, please include any relevant supporting documentation such as student learning outcomes, projected enrollments, letters of support and departmental handouts. (Use additional pages if necessary).

The School of Oceanography, Departments of Earth and Space Sciences and Atmospheric Sciences (all in the College of the Environment) will collaborate to create a minor in Climate Science. Currently, UW has no official program in Climate Science available for undergraduate students. Many classes on the topic are currently available in the three departments lists above, however, there is no clear path for students who want to get broad exposure to this important topic.

The minor offers students an interdisciplinary and flexible Climate Science track as part of their collegiate studies, regardless of major. Unlike a traditional disciplinary minor that is often selected deep within the tenure of a typical student, students will be encouraged to enroll in the Climate Science minor within their first two years. The Climate Sciences minor is designed to be a compelling draw to the university, and serves as an integrating function within the climate sciences community of the university. The units proposing the Climate Science minor request an exception to the rule that UW students must have earned a minimum of 90 credits before declaring a minor and request that any UW student in good academic standing can declare the Climate Sciences minor at any time.

Please see the added documentation.

**OTHER DEPARTMENTS AFFECTED**

List all departments/units/ or co-accredited programs affected by your new program or changes to your existing program and acquire the signature of the chair/director of each department/unit listed. Attach additional page(s) if necessary. \*See online instructions.

Department/Unit: Oceanography	Chair/Program Director: <i>REUmwll</i>	Date: 7/21/10
Department/Unit: Atmospheric Sciences	Chair/Program Director: <i>Robert [unclear]</i>	Date: 7/21/10
Earth and Space Sciences	<i>R. W. [unclear]</i>	7/21/10

**CATALOG COPY**

Catalog Copy as currently written. Include only sections/paragraphs that would be changed if your request is approved. Please cross out or otherwise highlight any deletions.

(This area is currently blank for catalog copy.)

**PROPOSED CATALOG COPY**

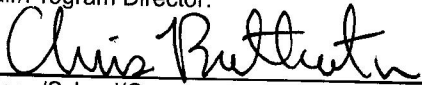
Reflecting requested changes (Include exact wording as you wish it to be shown in the printed catalog. Please underline or otherwise highlight any additions. If needed, attach a separate, expanded version of the changes that might appear in department publications). **Please note:** all copy will be edited to reflect uniform style in the General Catalog.

Climate Science Minor - 30-35 credits as follows:

1. Core Courses: PHYS 123; MATH 126; One of ESS 201, ATM S 211, or ATM S 321; One of OCEAN/FISH 452, OCEAN/FISH 453, AMATH 301, or Q SCI 381 (16-20 credits)
2. Integrated Capstone Experience: ATM S/ESS/OCEAN 486 (2 credits)
3. Science Electives: At least one course from each focus area to also include at least one course each from ATM S, ESS, and OCEAN. See advisor for list of approved electives. (minimum of 9 credits).
4. Policy Elective: one social science, policy, and energy course from an approved list of electives may be used to reach 30 credits.
5. Minimum 2.00 cumulative GPA courses applied to the minor.
6. Minimum 15 credits must be taken from the University of Washington.
7. Minimum 18 credits outside the student's major.

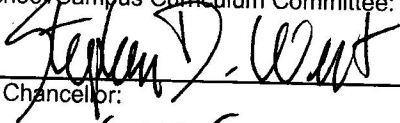
**APPROVALS**

Chair/Program Director:



Date:

College/School/Campus Curriculum Committee:



Date:

27 July 2010

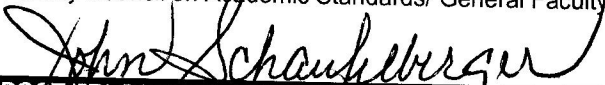
Dean/Vice Chancellor:



Date:

8/6/10

Faculty Council on Academic Standards/ General Faculty Organization/Faculty Assembly Chair:

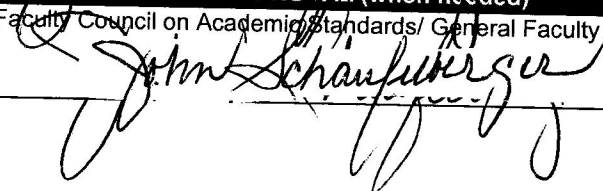


Date:

OCT. 22, 2010

**POST TRI-CAMPUS APPROVAL (when needed)**

Faculty Council on Academic Standards/ General Faculty Organization/Faculty Assembly Chair:



Date:

2/22/2011



Climate Science Minor - minimum of 25 credits:

1. One of ESS 201, ATM S 211, or ATM S 321. (3-5 credits)
2. One of OCEAN/FISH 452, AMATH 301, Q SCI 381, or STAT 311. (3-5 credits)
3. Integrated Capstone Experience: ATM S/ESS/OCEAN 475 (3 credits)
4. Science Electives: At least one course from each focus area to include at least one course each from ATM S, ESS, and OCEAN. See advisor for list of approved courses. (minimum of 12 credits)
5. Policy Elective: one social science, policy, or energy course from an approved list of electives to reach 25 credits.
6. Minimum 2.00 cumulative GPA in courses applied to the minor.
7. Minimum 15 credits must be taken from the University of Washington.
8. Minimum 18 credits outside the student's major.
9. Minimum of 15 credits must be upper division.

Note: Students are encouraged to take MATH 124, MATH 125, MATH 126, PHYS 121, PHYS 122, and PHYS 123 or see advisor in order to complete the requirements for the minor.

## **INTERDISCIPLINARY MINOR IN CLIMATE SCIENCE**

### **NOVEMBER 9, 2010**

The School of Oceanography, and the Departments of Earth and Space Sciences and Atmospheric Sciences (all within the College of the Environment) propose the implementation of a minor in Climate Science. Currently, UW has no official program in climate science available for undergraduate students. However, there are many courses available on the topic that can be combined in the minor to give students broad exposure.

The minor offers students an interdisciplinary and flexible Climate Sciences track as part of their collegiate studies, regardless of major. Unlike a traditional disciplinary minor that is often selected deep within the tenure of a typical student, students will be encouraged to enroll in the Climate Sciences minor within their first two years. The Climate Sciences minor is designed to be a compelling draw to the university, and serves as an integrating function within the climate sciences of the university. The units proposing the Climate Science minor request an exception to the rule that UW students must have earned a minimum of 90 credits before declaring a minor and request that any UW student in good academic standing can declare the Climate Science minor at any time.

#### **Principles of the Minor:**

1. Climate Science crosses disciplines and the topic engages all aspects of the earth system from the ocean to the air to the earth. An introductory course that covers the climate system that crosses these disciplines is required for the minor.
2. Because climate science requires an understanding of the fluid dynamics of the ocean and the atmosphere, students must have a fundamental understanding of both physics and calculus. Most students in the minor will take the calculus and physics series as part of their major.
3. Each unit offers a unique set of courses aimed at the student with Climate Science interests. To gain adequate breadth in climate science, students will need to sample from courses from three different topic areas.
4. In addition, each climate minor student will be required to take one course in each of the three core departments.

#### **Climate Science Minor Proposal**

*Coordinating Body:* The joint coordinating committee will be comprised of one faculty member and one academic advisor from each unit (Oceanography, ESS, Atmospheric Sciences). The advisors subgroup will handle day-to-day activities within the minor and seek the advice of the faculty for questions related to coursework, substitutions, transfer credits, etc. Faculty will be expected to stay on the committee for a minimum two-year commitment. In no year shall all three faculty members of the committee be new to the committee.

*Administration:* The Program on Climate Change will be the administrative home for the Climate Sciences Minor, while academic advising will be done by the academic advisors in Earth and Space Sciences, Oceanography and Atmospheric Sciences. The Program on Climate Change Board will serve as the faculty committee that oversees the minor with a member of the Program on Climate Change Board serving as the faculty lead. Initially, the targeted majors will be advised as listed below. For majors that are not listed, the lead faculty and Program on Climate Change staff will serve as a first point of reference for students, providing a venue for answers to general questions and for exceptions and substitutions of course work.

<b>Responsible advisor for targeted majors</b>	
Academic Advisor	Majors
Atmospheric Sciences	Atmospheric Sciences Applied Mathematics
Earth and Spaces Sciences	Earth and Space Sciences Environmental Engineering Physics
Oceanography	Oceanography Chemistry Biology Environmental Health

The program on Climate Change will be responsible for developing brochures, web site etc. to make the minor visible to the UW student community.

*Integrative Experience:* The minor shall have a mandatory integrating experience that will be aimed at integrating the educational experiences of the students and create a cohort of Climate Sciences students from different majors. This will take the form of the Program on Climate Change Fall Seminar series. Currently, this graduate course is cross-listed between the above three departments (OCEAN/ATM S/ ESS 586) and focuses on one topic relevant to climate change every fall. Speakers include those from both inside and outside the University. For each speaker, a paper is read by the graduate students, and they participate in a discussion with the organizing faculty member before the seminar. We will introduce a separate, three-credit section (475) of this course to serve undergraduate students, with the added expectation of a final paper. They will be required to take this course at least once. This will allow the students to not only interact with the speaker, but also with graduate students in the Program on Climate Change. We will rotate the organization of this seminar and the seminar topics among the three core departments.

## Projected Enrollment

We provide below an estimate of the number of CS minors we would expect after we reach steady state.

<b>Current Enrollments and CS Minor Projections:</b>			
Unit	# students	Likely Minor	Comments
Atmospheric Sciences	45	4	Assuming 10% multiplier
Oceanography	82	12	Assuming 30% multiplier for Physical, Chemical and Marine Geology Tracks.
Physics	180	18	Assuming 10%
Chemistry (not biochemistry)	559	28	Assuming 5%
Environmental Health	36	2	Assuming 5%
Earth and Space Sciences	113	10	Assuming 10%
Environmental Engineering	238	12	Assuming 5%
Applied Math	186	19	Assuming 10%
Biology	980	20	Assuming 2%
<b>TOTAL</b>	<b>2335</b>	<b>125</b>	About 5% of targeted majors

Note that the Marine Biology Minor performed a similar estimate in their proposal. Their targeted majors had 1626 total students and they estimated 173 minors. In their second year of operation, they have 120 declared minors.

## Structure for the Minor

The minor includes a minimum of 30 credits of study emphasizing climate science concepts and integration of climate studies with traditional core earth science disciplines (Atmospheric Sciences, Oceanography, and Geology and Geophysics). There is one required introductory courses (3-5 credits), one required integrative course (3 credits), and one course on tools for climate sciences (3-5 credits). The remaining 17-21 credits can be obtained from the pool of electives. As is required for all interdisciplinary minors, at least 60% of the 30 credits (18 credits) must be outside the requirements of the major. The integrative experience does not count towards a major.

Although students will not specifically be required to conduct research, opportunities for field work within courses, as well as summer internships and other climate science research opportunities will be made available and strongly advised for students who are not completing a capstone project within their major.

REQUIRED COURSES	NAME	OFFERED	CREDITS
ESS 201*** or ATM S 211 or ATM S 321****	The Earth System and Climate	A	5
	Climate and Climate Change	AWSp	5
	The Science of Climate	Sp	3
<i>Tools for Climate Science</i>			
OCEAN/FISH 452 or OCEAN/FISH 453 or AMATH 301 or Q SCI 381 or STAT 311	Spatial Information Technology in Ecosystem Sciences	Autumn	3
	Geospatial Pattern Analysis and Geostatistics	Spring	3
	Beginning Scientific Computing	A/W/Sp/S	4
	Introduction to Probability and Statistics	A/W/Sp/S	5
	Elements of Statistical Methods	A/W/Sp/S	5
<i>Integrative:</i>			
OCEAN/ATM S/ESS 475*****	Program on Climate Change Seminar (new course)	A	3

\*Prerequisite: MATH 126, MATH 129, or MATH 134, any of which may be taken concurrently; PHYS 122.

\*\*Prerequisite: either 2.0 in MATH 125, 2.0 in MATH 145, 2.0 in MATH 146, score of 5 on AB advanced placement test, or score of 4 on BC advanced placement test.

\*\*\*Prerequisite: either MATH 124, MATH 144, or Q SCI 291.

\*\*\*\*Prerequisite: minimum of grade of 2.0 each of MATH 124; MATH 125; MATH 126; PHYS 121; PHYS 122; PHYS 123.

\*\*\*\*\*Prerequisite: ESS201, ATMS 211 or ATMS 321. Does not count toward major.

The list of elective courses is designed to be expansive and allow majors to select courses that will provide in depth content in Climate Science while also meeting requirements within their selected major. These courses are arranged by topic area. Students must take one course from each focus area (*Past Climate, the Physical Climate, and Chemistry and Biology*) to also include one course from each of the three departments ATM S, ESS, and OCEAN.

SUGGESTED COURSES:CLIMATE CHEMISTRY AND BIOLOGY	NAME	OFFERED	CREDITS
OCEAN 400	Chemical Oceanography	Winter	4
OCEAN 430	Biological Oceanography	Autumn	4
ATM S 358	Fundamentals of Atmospheric Chemistry	Spring	3
ENVIR/FISH 330	Climate Change Impacts on Marine Ecosystems	Spring	5
ATM S 458	Global Atmospheric Chemistry	Autumn	4
BIOL 497	Ecology of Climate Change	Spring	3

SUGGESTED COURSES:THE PHYSICAL CLIMATE	NAME	OFFERED	CREDITS
OCEAN 423	Ocean Circulation and Climate	Spring	3
OCEAN 210	Ocean Circulation	Autumn	3
ATM S 301	Introduction to Atmospheric Sciences	Autumn	5
ATM S 340	Introduction to Thermodynamics and Cloud Processes	Winter	3
ATM S 341	Atmospheric Radiative Transfer	Spring	3
ATM 380 (proposed)	Weather and Climate Modeling		3
ATM 431	Boundary-Layer Meteorology	Autumn	3
ESS 416	Geophysics: The Atmosphere		3

SUGGESTED COURSES:PAST CLIMATE	NAME	OFFERED	CREDITS
ESS 433 (ESS majors)	Environmental Change in the Glacial Ages	Winter	5
ESS 431	Principles of Glaciology	Autumn	4
OCEAN 450	Climatic Extremes	Winter	4
OCEAN 355	From the big bang to the blue planet		3
ESS 461	Geological Time	Winter	3

Policy Elective: one social science, policy, and energy course from the list below may be used to reach 30 credits.

SUGGESTED COURSES	NAME	OFFERED	CREDITS
ENVIR/PHIL 416	Ethics and Climate Change		5
ENVIR/CHEM E/M E 442	Renewable Energy		4
ENVIR/CHEM E/M E 341	Energy and Environment	Autumn	3
SCAND/EURO 351	Scandinavia, the European Union, and Global Climate Change	Winter/Spring	5
GEOG 480	Environmental Geography, Climate, and Health	Winter	5
SMA/SIS 413	Environmental Degradation in the Tropics		5

A note about the targeted majors and first year math and physics requirements. We strongly encourage students participating in the climate minor to take MATH 126 and PHYS 123. Four of the targeted majors (Physics, Applied Mathematics, Earth and Space Sciences Geophysics Option, and Civil and Environmental Engineering) require these courses, while another two majors have these courses as options (Oceanography and Chemistry). Another four majors have as options the prerequisites for these courses. Because of the requirement for MATH 126 and PHYS 123 for some of the courses available in the minor, it is important that students be able to enter the Climate Science Minor early in their tenure at UW, so that they will be able to choose the appropriate series that will allow them to fulfill the math and physics requirements for their majors as well as allow them to fulfill the climate minor requirements.

REQUIRED COURSES FOR MAJOR	MATH	PHYSICS
<u>Majors requiring full Math and Physics Series</u>		
Physics	MATH 124,125,126	PHYS 121,122,123
Applied Mathematics	MATH 124,125,126	PHYS 121,122,123
Earth and Space Sciences Geophysics option	MATH 124,125,126	PHYS 121,122,123
Civil and Environmental Engineering	MATH 124,125,126	PHYS 121,122,123
<u>Majors with Math and Physics series optional</u>		
Oceanography	MATH 124,125,126 or MATH 144,145,146 or Q SCI 291,292	PHYS 114,115,116 or PHYS 121,122,123
Chemistry	MATH 124, 125, 126	PHYS 114,115,116 or PHYS 121,122,123
Environmental Health	MATH 124	PHYS 114,115 or PHYS 121,122
ESS Standard option	MATH 124,125, 126	PHYS 114/117, 115/118 or PHYS 121, 122
ESS Biology and Environmental Earth Sciences options	MATH 124, 125	PHYS 114/117 or 121
Biology	MATH 124,125 or MATH 144,145 or Q SCI 291,292	PHYS 114,115 or PHYS 121,122



Tri-Campus Review Comments:

**Seattle: Minor in Climate Science (COENV-20100714)**

**hinckley**  
THOMAS M  
HINCKLEY

I view this as a positive addition to the curricular choices offered students in the College of the Environment and the University of Washington - Seattle.

Tom Hinckley  
Interim Director, Forest Resources

**jmarms**  
JUDITH M ARMS

The Core courses say "One of OCEAN/FISH 452, OCEAN/FISH 453, AMATH 301, or Q SCI 381" (emphasis added). However, the catalog entry for OCEAN/FISH 453 says "Prerequisite: either Q SCI 381 or Q SCI 482; OCEAN 452." Thus if a student takes OCEAN/FISH 453, they've already taken OCEAN/FISH 452 and satisfied the requirement. This makes including OCEAN/FISH 453 in the core course list meaningless.

**wyersg**  
GISELLE E WYERS

This looks like a very valuable and relevant minor program and I enthusiastically support its adoption!  
Giselle Wyers, Music

**jmayer**  
JONATHAN D MAYER

There is huge concern with the impact of climate variability and climate change on society and the ability of societies to adapt. See recent IPCC reports where major sections/volume are devoted to this. It does not appear that students will be getting exposure to this--even one course would broaden the perspective, which I think needs to be done.  
Jonathan Mayer  
Epidemiology/Geography

**gusf15**  
JEFFREY H.  
GUSTAFSON

I see this as a positive addition to the UW curriculum. Win-Win for all in regards to academic focus on an area which needs more visibility. JG

**UNIVERSITY CAMPUSES UNDERGRADUATE PROGRAM REVIEW PROCEDURES\*\***

**CHECKLIST**

Title of Proposal: Minor in Climate Science (COENV-20100714)

Proposed by (unit name): College of the Environment

Originating Campus:

UW, Seattle

UW, Bothell

UW, Tacoma

**I. Phase I. Developed Proposal Review** (to be completed by Originating Campus' Academic Program Review body)

A. Review Completed by: (list name of program review body)

Chaired by:

08/10/10 Date proposal received by originating campus's review body

10/22/10 Date proposal sent to University Registrar

10/26/10 Date proposal posted & email sent to standard notification list

02/22/11 Date of originating campus's curriculum body approval

(Note: this date must be 15 business days or more following date of posting)

B. 5 Number of comments received. Attach the comments and a summary of the consideration and responses thereof : (1-2 paragraphs)

**II. Phase II. Final Proposal Review** (to be completed by FCTCP)

A. Review Completed by:

FCTCP subcommittee

FCTCP full council

Chaired by: Janet Primono (Sub-committee Chair), William Erdly (FCTCP Chair)

2/24/11 Date request for review received from University Registrar

3/9/11 Date of FCTCP report

## B. Review

A review was conducted and additional information requested regarding responses to three review items. Issues were addressed completely and approved by the FCTCP sub-committee and FCTCP Chair.

YES NO

- \_\_\_ Was notice of proposal posted on UW Website for 15 business days?
- \_\_\_ Was notice of proposal sent to standard mailing list 15 business days in advance of academic program review?
- \_\_\_ Were comments received by academic program review body?
- \_\_\_ Was response to comments appropriate? (explain, if necessary)
- \_\_\_ Was final proposal reviewed by FCTCP within 14 days of receipt?
- \_\_\_ Was there adherence to the University Campuses Undergraduate Program Review Process? (explain, if necessary)

## C. Recommendation

- \_\_\_ Forward for final approval
- \_\_\_ Forward to Provost because of University issues (Explain)
- \_\_\_ Return to campus council because of insufficient review (Explain).

\*\*Endorsed by Faculty Senate Executive Committee, 1/10/05, modified 1/31/06; These procedures apply to new undergraduate degrees, majors, minors (and certificates) and substantive changes to same