

COVER SHEET
NEW DEGREE PROGRAM PLANNING NOTIFICATION OF INTENT
(PLANNING NOI)

Program Information

Program Name: Climate Science and Policy

Institution Name: University of Washington Bothell

Degree Granting Unit: Science and Technology

Degree: B.S. Climate Science & Policy Level: Bachelor Type: (of) Science

Major: Climate Science and Policy CIP Code: 03.0199

Minor: N/A Concentration(s): N/A

Proposed Start Date: September 2010

Projected Enrollment (FTE) in Year One: 24
(# FTE)

At Full Enrollment by Year: 2015: 60
(# FTE)

Proposed New Funding: \$200,000

Funding Source: State FTE Self Support Other

Mode of Delivery

Single Campus Delivery UW Bothell

Off-site _____

Distance Learning _____

Substantive Statement of Need

See Attached

Contact Information (Academic Department Representative)

Name: Dan Jaffe

Title: Professor, Science & Technology; Adjunct Professor, Atmospheric Sciences

Address: University of Washington Bothell

UWI-Room 334, Box 358530

Bothell, WA 98011-8246

Tel.: 425 352-5357

Fax: 425-352-5233

Email: djaffe@u.washington.edu

 6/30/09
Endorsement by Chief Academic Officer Date

Table of Contents

I. Degree Program Description and Rationale	3
A. Program Goals	5
II. Relationship to Institutional and Unit Priorities	6
A. Mission.....	7
B. Strategic Plan	7
III. Demand.....	7
A. National Demand.....	8
B. Washington State Demand	8
C. Regional Demand.....	9
V. Student Demand.....	10
VI. Relationship to the HECB Master Plan & State and Regional Needs Assessment.....	10
A. HECB Master Plan Strategies	11
B. State & Regional Needs Assessment	12
VII. Proposed Curriculum	14
Assessment	14
VIII. Resources.....	15
Works Cited.....	16

We have a responsibility to protect the rights of generations, of all species, that cannot speak for themselves today. The global challenge of climate change requires that we ask no less of our leaders, or ourselves. (Maathai, 2007)

I. Degree Program Description and Rationale

The University of Washington Bothell proposes to offer a Bachelor of Science degree in Climate Science and Policy (CSP). Climate change is one of the defining issues of this century. It is global in its impact and how we respond will define the nature of our environment for centuries. Comprehending and responding to climate change requires linking understanding of the natural sciences with policy options. The proposed degree program is ideal for UW Bothell at this time because it builds upon our existing strengths including: 1) core classes in the natural sciences; 2) expertise in environmental policy; and 3) research and expertise in climate and sustainability. The program responds to significant regional need in that Washington State is a national leader in effective policy responses to climate change.

Climate science is an emerging field, but one that is rapidly growing as our understanding of the problem matures. Numerous scientific advisory bodies have weighed in on the climate issue and found that it represents one of the most pressing issues facing humanity today. For example, in 1997, a prestigious group signed the “World Scientists' Call for Action” to urge international cooperation on climate change. This was signed by 110 Nobel laureates, including 104 of the 178 living Nobel Prize winners in the sciences. It was also signed by 60 US National Medal of Science winners. The Intergovernmental Panel on Climate Change (IPCC) is the premier international organization charged by the UN to review data on climate change. The IPCC report produced for 2007 states, “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.... Most of the observed increase in global average temperatures since the mid-20th century is very likely due to

the observed increase in anthropogenic greenhouse gas (GHG) concentrations.” The US National Academy of Sciences also reviewed this topic at the request of President Bush. In its 2001 report NAS notes, “Human-induced warming and associated sea level rises are expected to continue through the 21st century.” In short, the scientific community has provided strong documentation and evidence for climate change. The general public and policy makers are now catching on to the strong scientific consensus. Research undertaken by one of UW Bothell faculty members is referenced in the 2001 and 2007 IPCC reports and demonstrates UW Bothell’s expertise in this arena.

Within the state of Washington much research has been done to understand the implications of climate change on our economy and way of life. The University of Washington Climate Impacts Group (CIG, <http://cses.washington.edu/cig/>) and the office of the Washington State Climatologist (www.climate.washington.edu) have compiled extensive data on climate within the state. These two groups have documented a number of changes in our state associated with changing climate, including changes in mean temperatures, changes in our annual snowpack and changes in water availability. Important future impacts in the state of Washington are likely in agriculture, water supplies, ecosystems and tourism (especially the ski industry).

Washington State has been a national leader on responding to climate change and is one of a handful of states that has pushed the federal government towards more aggressive policy actions on climate. Additionally, many of our local governments have aggressively pursued local actions to address climate change. In the private sector many of our largest industries have pursued policies to address climate change, even in the absence of government mandates.

While climate change poses substantial long-term risks for humanity, the problem is not unstoppable. The IPCC has shown that effective policies could stem the most severe consequences of climate change. These policies will require effective action by governments and industry at all levels. The actions will also require a substantial degree of global cooperation. To be effective in this arena, graduates must

understand the essential scientific issues, the moral dimension of the problem as well as effective policy actions. Our degree in Climate Science and Policy will be the first of its kind in the state and, to the best of our knowledge, the nation. Our primary program goal is to provide a new generation of graduates prepared to address the challenges of climate change by pursuing careers in government, industry and non-profit organizations.

A. Program Goals

“The scientific understanding of climate change is now sufficiently clear to begin taking steps to prepare for climate change and to slow it.” (National Academy of Sciences, 2008)---

Calculating the impacts of climate change will require extensive collaboration across disciplines as well as across sectors and across boundaries. A host of experts will be contributing to the dialogue and work on this issue including physical scientists, engineers, social scientists, medical scientists, business leaders, economists, and decision-makers at all levels of government. The primary goal of the program will be to produce graduates who grasp the complexity of the problem and can find opportunities in the solutions.

The Climate Science and Policy degree program will integrate fundamental courses in the sciences with courses in policy to produce graduates that are ready to tackle one of society’s most challenging issues in the 21st century. Graduates of this program will be prepared for careers in government, private and non-profit sectors or may wish to continue on to graduate school in either science or policy. Program goals are predicated on our strong commitment to making a difference as noted in the mission statement we articulated for the degree:

CSP will educate students as scientists to meet the critical demand for expertise in climate change and energy for the 21st century. Graduates will have a positive impact in both the public and private sectors.

Goals:

- Provide core science and math capabilities to all graduates of the program
- Provide to all graduates both physical science and policy education
- Provide advanced study opportunities for all students in either a climate science or climate policy track.
- Create a path for UW Bothell to partner with the public and private sectors to provide students cooperative education opportunities
- Prepare graduates to enter the job market, graduate school and to be entrepreneurs in the climate change field
- Position UW Bothell to become a national leader on research in climate change and its solutions.

II. Relationship to Institutional and Unit Priorities

Climate is an ideal interdisciplinary theme for lifelong learning about the scientific process and the ways in which humans affect and are affected by the Earth's systems. (U.S. Global Change Research Program & Climate Change Science Program, 2009)

The proposed degree program will be a cornerstone of the new Science & Technology Program at UW Bothell. Its innovative curriculum will complement the interdisciplinary and cultural identity of UW Bothell. The combination of science and policy will produce inclusive expertise that graduates can apply to real world issues.

One of UW's institutional priorities is to develop focused Science, Technology, Engineering, and Mathematics (STEM) degree programs to meet state and national demand for more STEM graduates. Our graduates will be integrated throughout the state, creating new technologies, teaching students at all levels, shaping local to global policy, and enriching the fundamental base of our economy and environment.

A. Mission.

The University of Washington Bothell Mission statement states, “We provide access to excellence in higher education through innovative and creative curricula, interdisciplinary teaching and research, and a dynamic community of multicultural learning.” Specific components of this include:

- Encourage and support collaborative, interdisciplinary and cross-program initiatives
- Emphasize and develop critical thinking, writing, and information literacy, in order to graduate students with life-long learning skills.

The Climate Science and Policy (CSP) degree embodies these ideals. Program development will be guided by the UW Bothell’s mission on a whole and the CSP’s mission as stated above.

B. Strategic Plan

The 21st Century Initiative establishes priorities for growth until 2020 for the University of Washington Bothell. Our top priority is to “serve the citizens of the State of Washington by providing access to a premier university education,” with special emphasis on developing new degree programs that respond to the economic development needs of the state and region. Science, Technology, Engineering and Math (STEM) and Health fields have been identified as top priorities for immediate growth. The proposed degree will support, and be housed in, our new Science and Technology Program. It will emphasize UW Bothell’s signature strength in interdisciplinary scholarship, bridging fields and making connections across the curriculum.

III. Demand

Climate change is becoming increasingly important to public and private decision-making in various sectors, such as energy, agriculture, emergency management, water management, insurance and architecture. Regardless of the direction graduates pursue, demand for science degrees is strong

nationally and regionally and will continue to grow. This emphasizes demand for the new degree offering.

A. National Demand

Climate science has become a national priority. The federal government is focusing on policy that will impact every state in the nation. Thus, this degree has immediate relevance. Students in this field will have strong employment opportunities in both the public and the private sectors. The UN projects that the low carbon economy will generate 20 million jobs worldwide over the next two decades. A University of Massachusetts economists estimates that within the US there could be up to 2 million jobs created if/when the US gets serious about addressing climate change. Currently there are several websites devoted to jobs in the climate arena. See for example the jobs postings at: <http://www.carbonpositive.net> and <http://www.coolclimatejobs.com/>. Within Washington State, employment opportunities will be especially strong as the State becomes a leader in developing policies and solutions to address climate change.

B. Washington State Demand

By 2020, the state's goal is to increase the number of clean-energy jobs to 25,000. (CTED, 2009)

Washington has devoted considerable resources to defining and planning State priorities related to climate and policy. "2008 Green Economy" is a report prepared by three agencies to forecast demand and growth in the emerging green economy solely in the private sector. This study was requested by the State Legislature in 2008 to address reducing greenhouse gas emissions in the Washington economy. (LMEA, 2009)

In defining the "Green Economy," the report indicates that it is rooted in the development and use of products and services that promote environmental protection and energy security. (LMEA, 2009) It describes four core areas in which industries and businesses are engaged:

- Energy efficiency
- Preventing and reducing pollution

- Renewable energy
- Mitigating or cleaning up pollution

Our state leaders comprehend the scope and impact of climate science and are pursuing an aggressive approach that will benefit from education, research and collaboration. The proposed Climate Science and Policy degree will produce graduates who will be ably prepared to enter the “Green Economy.”

C. Regional Demand

Puget Sound is in the forefront of responding to climate change. The crosscutting nature of responding to this issue has brought diverse sectors together to work cooperatively on solutions. This translates into abundant opportunities for UW Bothell and its students. It is significant to note that regional counties and municipalities belong to the International Council for Local Environmental Initiatives (ICLEI), which was started in 1990 as a global organization committed to sustainable development.

Cities for Climate Protection (CCP) is an ICLEI program that assists cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability. Regional members participating in the CCP program are Bothell, Bellevue, Seattle, King and Snohomish counties to name a few. The new degree program will be springboard for launching partnerships with communities and governing bodies.

V. Student Demand

UW Bothell is collecting data on student interest in our proposed new degree programs under development. An ongoing survey for new programs instituted March 2009 indicates that 67% of the students who visit the UW Bothell website are interested in STEM degree programs:

Proposed Programs	# Responses	%
All proposed new programs	202	100.00%
STEM programs	135	66.83%
Other programs	67	33.17%

These results forecast high interest in our STEM programs and signal promise for the proposed degree as well as our new Science and Technology unit.

The Climate Science and Policy degree Program will admit 24 FTE (students) in its first year, attending full- or part-time. The goal is to reach full enrollment (60 students) by year five. UW Bothell expects student flow to come from a combination of UWB students and students from regional community colleges. We will also devote attention to educational outreach with engagement programs and events. The objective is to attract a diverse group of students with wide – ranging interests that will enrich the program and the campus.

VI. Relationship to the HECB Master Plan & State and Regional Needs

Assessment

The Green-Economy Jobs Initiative is larger than just jobs. It's also about new research, investments in innovation, and incentives and regulations to stimulate more sustainable activities. It's about tax structure, revenue and international trade in a carbon constrained world. (CTED, 2009)

The Higher Education Board outlines two primary goals in its strategic plan:

Goal 1: We will create a high-quality higher education system that provides expanded opportunity for more Washingtonians to complete postsecondary degrees, certificates, and apprenticeships.

Goal 2: We will create a higher education system that drives greater economic prosperity, innovation and opportunity.

UW Bothell's charge is to provide educational opportunity and increase access for the region and community. We structure every program with the goal of incorporating gateways and supports for our students who are non-traditional or from underserved populations. The proposed program will address regional prosperity by educating graduates who will be prepared to enter high demand and growth industries in the region and throughout Washington State. It has the additional focus of being a STEM-oriented degree program thereby encouraging secondary education and pipeline institutions to strengthen and support STEM curricula.

A. HECB Master Plan Strategies

The current economic climate puts UW Bothell in the position to promote enrollment because UW Seattle will be restricted in terms of new enrollments and transfer enrollment. We can use our new programs to address the objective of "educational attainment." The Climate Science and Policy degree structure promotes the core objectives in the Master Plan:

1. Focus on diversity. UW Bothell strives to bring a significant population of non-traditional students to science and technology fields, including underserved populations and students with disabilities. Included in the seven priorities of the 21st Century Initiative is our commitment to diversity and inclusiveness.

This objective enriches the educational experience while strengthening ties with stakeholders.

Strategies for the proposed program include educational outreach, STEM summer institutes, and layered internal academic support for students.

2. Create higher expectations for K-12 students. The CSP program will provide a unique platform to demonstrate how Climate Science can be integrated through all levels of education. It will generate science educators whose focus will be synthesis and integration of knowledge across core curricula.

Also, the scope and immediacy of the discipline will generate interest in math and sciences and, in turn, attract many students who otherwise would not have an interest in the sciences.

3. Create a system of support for lifelong learning. Embarking on a journey of discovery through a discipline that has comprehensive and vital implications for our day-to-day and future existence cultivates an attitude for lifelong learning. The CSP degree will employ traditional classroom and interactive modes of learning while addressing subject matter using problem-based and integrative approaches. Such a combination of approaches will speak to students with a diversity of learning styles and equip them to tackle a range of future challenges. Advising, periodic assessment, and structured support services will contribute to the academic success of students.

B. State & Regional Needs Assessment

According to the State and Regional Needs Assessment Report (SRNA), the state is not producing enough graduates to meet demand in health and technical professions (WHECB, rev. 2006). The report also notes, “The need for higher education in Snohomish County is especially strong, given the focus the county has on their “Innovation Economy.” Though this type of economy includes high-tech industries like biotechnology, medical devices, telecommunications, high-tech manufacturing, and software, it also refers to new ways of doing business in traditional sectors with rapidly changing technology, processes, and information.” (WHECB, rev. 2006) The proposed degree in Climate Science and Policy responds to both statements as it will prepare graduates to meet both state and regional demand.

1. Fill unmet needs in high-demand fields. Situated in King and Snohomish counties, UW Bothell is a part of “the hub for technological and scientific development” (WHECB, rev. 2006). This means baccalaureate education is required to meet employer demand. Thus, developing adequate regional talent holds great appeal for employers. Recognizing the importance of collaborating with regional

partners, UW Bothell is encouraged to create degree programs that will provide industry-ready graduates.

2. Promote student enrollment in STEM fields. A Science and Technology(S&T) unit was recently approved and established at UW Bothell. The CSP degree will be a hallmark program defining the pioneering spirit of the new S&T unit. The proposed degree along with other S & T programs in development, underscores UW Bothell's commitment to STEM education. Classes developed and implemented for CSP will provide infrastructure needed to launch programs in math, chemistry and physics. The growth of the STEM disciplines at UW Bothell directly addresses a delineated State and Regional Needs Assessment report expectation.

3. Expand research capacity: The SRNA report refers to a declining number of graduates in research while noting a need for higher levels of training. A focus of the CSP degree will be to involve faculty and students in collaborative research. UW Bothell's Office of Research Support (ORS) will provide administrative support for research and assist in identifying and connecting the program with relevant research opportunities regionally and nationally. Students in the program will be encouraged to participate in UW's annual research symposium for undergraduates now in its twelfth year.

While we can enumerate many direct correlations to the HEC Board's Strategic Master Plan, and SRNA, it may be more difficult to quantify UW Bothell's intense dedication to STEM education and making the proposed Climate Science and Policy program a success. A fact that underscores this dedication, however, is our location in protected wetlands. We have incorporated stewardship of the wetlands into every aspect of the educational experience from administration to the classroom and have expanded the reach to include programs for middle and high school age students as well:

<http://www.uwb.edu/education/imagine/index.xhtml>.

VII. Proposed Curriculum

The CSP major will include two tracks: a science emphasis and a policy emphasis. A common core of coursework will be required for the program. The table below details the specifics of the two tracks.

The curriculum will take into account entering freshmen as well as transfer students.

Level/Credits	Science track	Policy track
100 level core math/science 35 credits	General chemistry (3 quarters) Physics (minimum 2 quarters)	
	Calculus (2 quarters)	Pre-calculus Introduction to statistics
200-300 level 45 credits	Introduction to Climate Science and Policy Statistics for Scientists and Engineers Science methods and practice Introduction to climate modeling Energy and greenhouse gas emissions Introduction to Climate policy	
	Any 3 of the following courses:	
	Atmospheric chemistry	Environmental Management
	Thermodynamics	Human & Ecological Impacts
	Advanced climate modeling	Advanced climate policy
10	Other approved courses in science or math or policy	
10	Undergraduate research or Internship	
70	Electives	
180 credit total		

Assessment

A formal system of assessment of student learning and long-term success, and curricular effectiveness, will be developed. This will allow us to assess newly developed courses and approaches for student preparation, learning, career outcomes, and faculty development. Critical reflection and response will allow us to continually improve student experiences and outcomes through the early years of degree development and into the future.

VIII. Resources

The smell from 10 million North Carolina hogs isn't just unpleasant — it's actually changing the Earth's climate. But therein lies an opportunity. (Fereshteh, 2009)

The CSP program is an appropriate undertaking considering UW Bothell's existing resources and signature strengths. There are also resources allocated for the S & T unit that will contribute to programmatic function and support.

Physical Resources: In the 2009 session, the legislature approved funding for design of the third UWB building and our first dedicated to Science at UWB. This marks STEM education as a priority with the legislature. Current class and lab facilities are sufficient for this degree, but with the development of new programs and UW Bothell's increasing enrollment, we will reach capacity by the end of the biennium.

Projected Human Resources: Of the required courses for the CSP degree, approximately 2/3 either already exists at UWB or can be offered by current faculty members. Projected need for CSP includes 1 new faculty (1 FTE) and 1 jointly appointed faculty. Staffing needs include the following: program administrator, program advisor/recruiter, laboratory assistant and IT support. However, staffing will be shared across S&T degree offerings.

Support Services: UW Bothell has learning centers including a quantitative skills and a teaching and learning center. Optimization of campus services for the proposed CSP program will also include the need for library and technical support.

Equipment: The CSP degree will require some new equipment, including a new research level workstation to conduct climate simulations/visualizations and some greenhouse gas monitoring instrumentation. Students can use the existing UWB computer labs to access this workstation and do visualizations and can use existing lab space for classes and research.

Works Cited

CTED. (2009). *The Green-Economy Jobs Initiative*. Olympia: Community Trade and Economic Development.

Fereshteh, A. (2009, February 10). *Growing a Green Economy "Green Tech Can Restore American Manufacturing*. Retrieved May 7, 2009, from Duke Research: <http://research.duke.edu/greeneconomy/>

LMEA. (2009). *Washington State Green Economy Jobs*. Olympia: Washington State Employment Security Department.

Maathai, W. (2007). Africa Must Be Heard on Climate Change. *The East African* .

National Academy of Sciences. (2008). *Understanding and Responding to Climate Change*. Washington, DC: NAS.

U.S. Global Change Research Program & Climate Change Science Program. (2009). *Climate Literacy The Essential Principles of Climate Science*. Washington, DC: National Oceanic and Atmospheric Administration.

WHECB. (rev. 2006). *State and Regional Needs Assessment Report*. Olympia: HECB.