



OFFICE OF THE PRESIDENT

May 29, 2012

Vice Chancellor Susan Jeffords
University of Washington, Bothell
Box 358522

Dear Susan:

Based upon the recommendations of the Executive Council, the General Faculty Organization has recommended approval of a Bachelor of Science degree in Climate Science and Policy. A copy of the approval is attached.

I am writing to inform you that the Science and Technology program is authorized to specify these requirements beginning autumn quarter 2012.

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,

A handwritten signature in black ink that reads "Michael K. Young".

Michael K. Young
President

Enclosure

cc: Dr. Dan Jaffe (with enclosure)
Mr. Robert Corbett (with enclosure)
Dr. Deborah H. Wiegand (with enclosure)
Ms. Virjean Edwards (with enclosure BST-20120308)



CREATING AND CHANGING UNDERGRADUATE ACADEMIC PROGRAMS

MAN 2 8 2012
MAR 9 8 2012

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Control #
BST-20120308

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>

College/Campus UW Bothell	Department/Unit Science & Technology	Date March 8, 2012
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New Programs

- Leading to a Bachelor of _____ in _____ degree.
- Leading to a Bachelor of Science degree with a major in Climate Science & Policy.
- Leading to a _____ Option within the existing major in _____.
- Leading to a minor in _____

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 12**

Contact Person: Dan Jaffe	Phone: 2-5357	Email: djaffe@uw.edu	Box: 358581
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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).

Proposal Attached

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:	Chair/Program Director:	Date:
Department/Unit:	Chair/Program Director	Date:


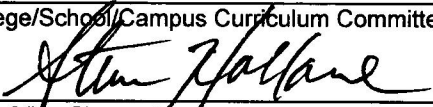


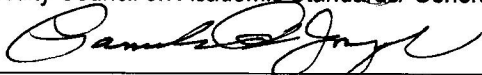
CATALOG COPY

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.

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.

APPROVALS

Chair/Program Director: 	Date: March 8, 2012
College/School/Campus Curriculum Committee: 	Date: 3-13-12
Dean/Vice Chancellor: 	Date: 3-26-12
Faculty Council on Academic Standards/General Faculty Organization/Faculty Assembly Chair: 	Date: 5/2/12
POST TRI-CAMPUS APPROVAL (when needed)	
Faculty Council on Academic Standards/General Faculty Organization/Faculty Assembly Chair: 	Date: 5/2/12

W UNIVERSITY of WASHINGTON BOTHELL

Office of the General Faculty Organization

To: Faculty Council on Tri-Campus Policy

From: Pamela Joseph, Chair, Executive Council of the General Faculty Organization, University of Washington Bothell

Date: May 1, 2012



Re: Executive Council Approval of Climate Science & Policy

The Executive Council (EC) of the General Faculty Organization of University of Washington Bothell reviewed the responses from the tri-campus review of the proposal for the Climate Science & Policy at its May 1, 2012 meeting. The EC has determined that the proposing faculty in the Science and Technology Program have duly considered and responded to the comments posted by faculty from across the three campuses during the tri-campus review period. The EC furthermore voted to approve the Climate & Policy proposal.

Please let me know if you need any additional information.

FORM 2

**COVER SHEET
NEW DEGREE PROGRAM PROPOSAL**

Part I requires the completion of the following forms: Appendices B-4, B-5, and B-6.

Program Information

Program Name: **Climate Science & Policy**

Institution Name: **University of Washington Bothell**

Degree Granting Unit: **University of Washington Bothell**

(e.g. College of Arts and Science)

Degree: **BS**

Level: **Bachelor**

Type: **Science**

(e.g. B.S. Chemistry) (e.g. Bachelor) (e.g. Science)

Major: **Climate Science**

CIP Code: **40.0402**

(e.g. Chemistry)

Minor: **NA**

(if required for major)

Concentration(s):

(if applicable)

Proposed Start Date: **Autumn 2012**

Projected Enrollment (FTE) in Year One: **20**

At Full Enrollment by Year: **2015: 40**

(# FTE) (# FTE)

Proposed New Funding: **357,000**

Funding Source: State FTE

Self Support

Other

Mode of Delivery / Locations

Campus Delivery **UW Bothell**

(enter locations)

Off-site _____

(enter location(s))

Distance Learning _____

(enter formats)

Other

Note: If the program is the first to be offered at a given site or location, the submission must also include the information required for the establishment of a new teaching site as outlined in section B.1 of the Program and Facility Approval Policy and Procedures.

Scheduling

Day Classes

Evening Classes

Weekend Classes Other *(describe)*

Attendance Options

Full-Time

Part-Time

Total Credits: **90** Quarter

Semester

University of Washington Bothell

Proposal for a Bachelor of Science Degree in
Climate Science and Policy

5 January 2012

I. Introduction	3
A. <i>Degree Program Description and Rationale</i>	3
B. <i>Relationship to UW Bothell Mission</i>	4
C. <i>Climate Science and Policy Degree Program</i>	7
i. Program Goals	7
ii. Learning Objectives	8
II. Need for Program	8
A. <i>National Demand</i>	8
B. <i>State of Washington Demand</i>	9
C. <i>Regional Demand</i>	10
D. <i>Student Demand</i>	11
III. Statewide Strategic Master Plan for Higher Education	12
IV. Relationship to Other Institutions	13
A. <i>Regional Schools</i>	13
i. UW Bothell Environmental Science	13
ii. UW Seattle	14
iii. Huxley College of the Environment	15
iv. Central Washington University	16
v. Community Colleges	16
B. <i>National Programs</i>	16
i. Johns Hopkins University	17
ii. Bard Center for Environmental Policy	17
V. Proposed Curriculum	18
A. <i>Courses currently offered at UWB</i>	19
B. <i>New courses to be developed</i>	20
C. <i>Course track</i>	21
VI. Infrastructure Requirements	22
A. <i>Facilities</i>	22
i. Teaching laboratories	22
ii. Computing Facilities	23
B. <i>Support Services</i>	24
i. Academic Transition Program	24
ii. Counseling Services	24
iii. Disabled Student Services	24
iv. Library	25
v. Media Center	26
vi. Quantitative Skills Center	27
vii. Writing Center	27
viii. Information Technologies	27

VII. Faculty	28
<i>A. Current Faculty</i>	<i>28</i>
<i>B. New Faculty</i>	<i>29</i>
VIII. Administration	30
<i>A. Administrative Structure</i>	<i>30</i>
<i>B. Committees</i>	<i>30</i>
<i>C. Support Staff</i>	<i>30</i>
IX. Students	31
<i>A. Diversity Plan</i>	<i>31</i>
<i>B. Services for pre-majors</i>	<i>31</i>
X. Assessment Plan	32

I. Introduction

The Science and Technology Program (S&T) of the University of Washington Bothell (UWB) proposes to offer a Bachelor of Science degree in Climate Science and Policy (CS&P) beginning in Fall 2012. This degree program will be based on a comprehensive STEM curriculum in climate science with substantive policy science requirements.

A. Degree Program Description and Rationale

“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 concentrations... Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns.*

“Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change...

*“Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would **very likely** be larger than those observed during the 20th century.”*

Intergovernmental Panel on Climate Change, 2007: Summary for Policymakers.

As greenhouse gas emissions and global temperatures continue to rise, climate change will become one of the defining issues of this century. How we respond will affect our economy and environment for generations. Finding true solutions will depend on scientists and policy makers with an integrated knowledge of climate science, energy technology, political science, and economics. Consequently, to build the workforce to address this issue, we must provide a multi-disciplinary education reaching across the core natural sciences, engineering, and social sciences. Parts of this field, such as atmospheric sciences and environmental policy, have long been taught at universities worldwide as distinct degree programs. Increasing awareness of the complexity of

the challenges facing humanity in the 21st century, however, has put integrated science and policy education at the forefront to solve problems of global sustainability.

The climate system involves interactions among chemical, biological, geophysical, and fluid dynamical systems, which are understood and modeled using field and laboratory experiments, high performance computing, and applied mathematical methods. In addition, the effects of human activity on the natural environment link our climate to political and economic policy. Due primarily to the effect of fossil fuels emissions, climate change and energy technology have become coupled problems that will be influenced by the development of alternative energy, energy efficiency, and carbon management strategies.

Developing institutional policies to reduce emissions and to adapt to climate change requires a workforce with broad understanding of both the natural and social sciences. Consequently, *scientists trained in both climate science and public policy will be instrumental in formulating and implementing solutions that are firmly grounded in science.* Likewise, students educated in both fields will be uniquely prepared and in demand for a variety of public and private sector jobs that are either implementing climate mitigation plans (*i.e.* to reduce greenhouse gas concentrations) or developing climate adaptation strategies (*i.e.* to maintain economic growth and protect the environment in a changing climate). This education requires a full understanding of the three components of the proposed major: climate science, energy, and policy.

The program will be exceptional in focusing on this nascent discipline and workforce. It is responsive to the needs of the State of Washington, supporting the State's leadership and innovation in reducing greenhouse gas emissions, developing climate adaptation plans, and building a green economy (see <http://www.ecy.wa.gov/climatechange>). Numerous private businesses and public agencies in the state and region are actively working on issues of climate, sustainable energy, and policy. Our degree program will produce graduates who will meet these challenges in the region as well as nationally

B. Relationship to UW Bothell Mission

The University of Washington Bothell is committed to providing a world-class education meeting the needs of the community while also proudly upholding University of Washington

standards of quality and access. UW Bothell is home to more than 3,200 full-time students with majors in the following programs: Business, Computing & Software Systems(CSS), Education, Interdisciplinary Arts & Sciences (IAS), Nursing, and Science and Technology (S & T).

The proposed CS&P degree is responsive to UW Bothell's mission, vision and core values. The preface of the mission states that UW Bothell will "Provide access to excellence in higher education through innovative and creative curricula, interdisciplinary teaching and research, and a dynamic community of multicultural learning." In addition to introducing an innovative and emerging discipline, CS&P will be the first major at UW Bothell in the physical sciences. This means that the degree will attract students who wish to focus in areas relating to chemistry and physics, but would particularly like to use these skills in an applied technology arena.

The CS&P program is structured to articulate UWB's mission goals:

- Emphasize and develop critical thinking, writing, and information literacy, in order to graduate students with life-long learning skills.

Teaching critical thinking, writing, and information skills are strong elements of this program, and perhaps more so than in traditional science and technology degrees. In order to succeed, graduates will be required to assimilate information from a broad range of disciplines, critically analyze conflicting view points and priorities, and effectively communicate complex ideas and results both in writing and verbally. The program will also provide research experiences, both inside and outside the classroom, which will insure graduates acquire life-long learning skills.

- Actively recruit and support outstanding faculty scholars with a passion for communication.

The proposed degree program will build on existing strengths of UWB faculty and complement existing degree programs in Environmental Studies and in Science, Technology & Society, and the BS degree in Environmental Science. Several faculty in these areas maintain internationally recognized research and scholarship (see section VII.A), and will provide the foundation for recruiting additional faculty in the areas of Climate Science and Policy.

Institutionally, UW Bothell Office of Research Support actively assists faculty members in pursuing funding and grant opportunities that contribute to research and scholarship. Research in Progress (RIP) and Research Interest Groups (RIG) expand opportunities for collaboration and

promotion of faculty work. The Teaching and Learning Center provides continuous faculty development opportunities to improve teaching skills including using new technologies. Science and Technology, as a newer program at UWB, places a high priority on professional development and mentoring of new faculty as both scholars and teachers.

- Encourage and support collaborative, interdisciplinary, and cross-program initiatives.

By design, the Climate Science and Policy degree is interdisciplinary, and draws on core physical sciences, mathematics, thermodynamics, ecology and policy. As such, the degree will include courses taught by faculty across multiple programs. Essential courses will be drawn from Science and Technology (S&T) disciplines, policy and environmental subjects in Interdisciplinary Arts and Sciences (IAS), and high-performance computing initiatives in Computing and Software Systems (CSS). We expect to offer courses at all levels in the curriculum that will serve other programs at UWB (for example, other physical sciences, Environmental Studies, or Science, Technology, and Society) and encourage interaction and dialogue among students from different academic backgrounds.

- Provide quality curricula by making use of the best of educational technology in support of teaching and learning.

The curriculum for the Climate Science and Policy will be built around proven educational techniques including inquiry-based learning and active learning. Given the regional action on climate issues and strong faculty research, the program will be able to draw real world and local problems into the classroom. Furthermore, the scientific knowledge and issues surrounding climate change are rapidly emerging, so it will be more important for students to become skillful learners than to master an established body of knowledge. Achieving this outcome will require using the best available educational methods and resources.

- Foster productive relationships with the employment community and promote a strong public service commitment.

UW Bothell is committed to advancing partnerships and is home to a number of award-winning community partnerships. Partnership development is promoted through the Office of Community-Based Learning and Research. Support structures include EXPO Registration that gives agencies and organizations the ability to connect with faculty and explore curriculum engagement and the

Initiative for Community Based Learning and Research. This initiative promotes and supports faculty and staff development of community-based scholarship and service learning opportunities for UW Bothell students. CS&P is rife with opportunities for developing partnerships with regional businesses and community organizations and in turn, will secure practical real world experiences for students.

C. Climate Science and Policy Degree Program

The Climate Science and Policy degree program will admit 5-10 students in year one and will reach 20 annual admissions by year five. Given the rapid growth of FTE students on Campus, especially in STEM disciplines, this program will provide a needed STEM degree option for upper division and transfer students. In particular, we anticipate that the major will help UWB retain students with an interest in a physical science major in the absence of a chemistry or physics major. Once these majors begin, we expect they will grow the pool of students with skills and interests in the CS&P degree.

The proposed major will prepare students for various career paths after graduation, and students may select appropriate electives to support their interests. This flexibility will give students interested in alternative energy technology the choice of complementary courses in electrical engineering, students interested in graduate school or research would select research-oriented and mathematics courses, and students interested in private sector jobs may select courses in management.

i. PROGRAM GOALS

The goals of the Climate Science and Policy Degree are: Offer a challenging, integrative curriculum that allows students to develop skills, knowledge, and understanding of climate science including foundational physical science and relevant policy.

1. Incorporate active learning, including student-faculty collaborative research
2. Prepare students for advanced study or for careers in climate science, energy, resource management, and related policy
3. Become a center of excellence in climate science research incorporating faculty and student contributions

4. Broaden participation of under-represented groups in the physical sciences by targeted recruitment and attention to the interaction of science and societal issues
5. Foster partnerships in climate research and education with industry, government agencies, and non-profits, both regionally and nationally; and
6. Use flexible and innovative instructional methods as appropriate to facilitate participation by a more diverse student body

ii. LEARNING OBJECTIVES

The learning objectives of the Climate Science and Policy degree are:

- **Scientific knowledge.** Students should have a foundational understanding of mathematics, chemistry, and physics, and develop an advanced understanding of climate science.
- **Policy knowledge.** Students should develop a substantial understanding of key economic and political science concepts, and learn to integrate this knowledge with issues of climate change, adaptation, mitigation and energy systems.
- **Scientific Inquiry.** Students should develop an understanding of the scientific method and use that understanding to conduct and communicate climate research.
- **Critical thinking.** Students should learn to apply qualitative and quantitative methods to critically evaluate and interpret evidence from multiple disciplines.
- **Communication.** Students should convey science and policy concepts effectively in written, oral, and visual presentations. Students should translate the results of original research to specialists and non-specialists.

II. Need for Program

“Investments in clean energy and green jobs are a 3-in-1 solution. They turn big challenges—energy, climate change, and the economy—into big opportunities for families and businesses in our communities” Sightline Institute

The emerging discipline of Climate Science and Policy responds to the fact that existing jobs are changing, new jobs are being invented, and well-educated students can look to a promising future of new opportunities.

A. National Demand

Climate and energy are national priorities that have generated legislation and policies that impact every state in the nation. The focus of this degree program is on target with these developments. Students in this field will have strong employment opportunities in both the public and private sectors. The UN projects that the low carbon economy will generate 20 million jobs worldwide

over the next two decades. 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/>.

Examples of current job openings are provided in an Appendix. Two are from The Climate Corporation, which helps people and businesses adapt to climate change; one is from AIR Worldwide, a scientific leader and respected provider of risk modeling software and consulting services. These jobs illustrate the rapid expansion of climate-related careers in the traditional business sector. The proposed major is specifically tailored to the needs of these companies to provide climate services to businesses. Additionally, there are a large number of public agencies (federal, state, and local) and non-governmental agencies that work directly with climate related issues which provide numerous career opportunities.

B. State of Washington Demand

“Washington has tremendous opportunities to build a healthier and more prosperous future by embracing the challenge of climate change through expanding our clean energy economy... [The state shall:] By 2035, reduce greenhouse gas emissions in the state of Washington to 25% below 1990 levels, a reduction of 30 million metric tons below 2004... By 2020, increase the number of clean energy sector jobs to 25,000 from the 8,400 jobs we had in 2004.” EXECUTIVE ORDER 07-02: Washington Climate Change Challenge, 2009

Within Washington, employment opportunities will be especially strong as the state becomes a leader in developing policies and solutions to address climate change. The Climate Science and Policy program is designed to provide students with foundational knowledge that can lead to a range of opportunities in employment with advanced education. This table is from Workforce Explorer and reveals the most recent data on employment in Washington. All occupations listed in the table were reported to be “In Demand” and “Green.” Occupations are labeled “In Demand” based on a ranked index using:

- Occupational projections
- Unemployment Data and
- Job Vacancy Rates

The “Green” labeled jobs promote environmental protection and clean energy by:

- Increasing energy efficiency.
- Producing renewable energy.
- Preventing and reducing environmental pollution.
- Providing mitigation or cleanup of environmental pollution.

Washington State	Employment Projections		Change	Percent Change	Average Annual Openings
	2008	2018			
Natural Sciences Managers	1,622	1,820	198	12.2	71
Env. Scientists and Specialists, Incl. Health	4,054	4,659	605	14.9	184
Environmental Engineering Technicians	318	353	35	11.0	10
Environmental Engineers	1,464	1,631	167	11.4	49
Environmental Science and Protection Technicians	776	901	125	16.1	48
Geoscientists	1,148	1,339	191	16.6	55
Urban & Regional Planners	3,018	3,031	13	0.2	56

C. Regional Demand

"We must invest in our future, directly tackling the environmental challenges facing this county. In the short-term, we're inviting our citizens, cities, businesses and public agencies to partner with us in finding ways to reduce and eliminate our sources of greenhouse-gas (GHG) emissions. For the long-term, we will become a leader in sustainable job growth, a promoter of innovative clean energy and a protector of the environment and natural resources. Others will look to us as an example of a county that on every level is sustainable. It's a continuous process, but one we're committed to achieve." - Aaron Reardon, Snohomish County Executive

The Puget Sound region, including King County, Snohomish County, and the City of Bothell are committed to promoting education on energy and sustainability. For example, the Snohomish County Office of Energy and Sustainability works in collaboration with residents, businesses, agencies, local governments and community groups to protect the environment, conserve energy and foster sustainable communities. They provide education, outreach and partnerships that inspire everyone to take action and build a more sustainable Snohomish County.

The Puget Sound region is in the forefront in responding to climate change. The crosscutting nature of responding to this issue has brought diverse political, cultural, and educational sectors together to work cooperatively on solutions, which translates into abundant opportunities for UW Bothell and its students. It is significant to note that several 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 include Bothell, Bellevue, Seattle, King and Snohomish counties. The new degree program will be a springboard for launching partnerships with these communities and governing bodies.

Another indicator of demand for Climate Science and Policy education in the region is demonstrated by the participation in the Pacific Northwest Climate Science Conference, held the past two years by a consortium of universities and public agencies. The table below shows the composition of attendees to the 2010 conference, indicating the large number of regional policy makers and resource managers with a vested interest in climate science.

Attendees	Place of Employment
Scientist 50%	University 34%
Policy maker 15%	Public agency 51%
Resource manager 14%	NGO 5%
Other 22%	other 10%

D. Student Demand

Academic paths to climate science careers vary due to the limited number of undergraduate programs of study specific to the discipline. Programs exist at the graduate level and include both masters and doctoral level degrees. However, this is a rapidly growing field, which underscores the need to develop innovative undergraduate programs structured to provide graduates with a choice of career paths. CS&P is just that program. Students are well informed of the advantage in having a STEM degree, so the STEM curriculum moves CS&P to the front in terms of demand. The growth of our S & T program and the CS&P interdisciplinary curriculum reinforces that graduates will have the knowledge and skills to address climate issues and challenges across sectors.

III. Statewide Strategic Master Plan for Higher Education

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 increased access for the region and community. We structure programs with the goal of incorporating flexibility and support for our students, particularly those who are non-traditional or from underserved populations. The CS&P program will address regional prosperity by educating graduates who will be prepared to enter high demand and growth industries in the State. The proposed CS&P degree program promotes the core objectives in the HEC Board Strategic Master Plan listed below:

Fill unmet needs in high-demand fields. Climate Science is a rapidly developing field and demand for graduates will likely grow quickly, as indicated by the demand analysis presented above. Additionally, few programs regionally or nationally specifically address the educational needs of this field.

Promote student enrollment in STEM fields. The Science and Technology Program (S&T) was launched at UW Bothell in 2009, and will be the home unit of the CS&P degree program. Climate Science and Policy is the first physical science major to be proposed in S&T, and will bolster growth and eventual majors in traditional STEM fields such as mathematics, chemistry, and physics. The CS&P major will provide an opportunity for students interested in physical science before these additional majors are available.

Expand research capacity: Existing faculty currently conduct research in climate science and related areas. The development of this new program will enhance the ability of faculty and students to engage in collaborative research by attracting qualified students and enhancing the university's reputation in the areas of climate science and energy research. UW Bothell's Office

of Research Support (ORS) already provides administrative support for research and will assist in identifying and connecting the program with relevant research opportunities.

IV. Relationship to Other Institutions

“Indeed, how well have we as U.S. educators done in recent years to foster a climate literate, energy aware society? As an educator focused on these topics, I believe we have failed in providing our students the necessary background for understanding the basics of climate – which is a prerequisite for understanding anthropogenic climate change – or in helping them appreciate the ecological and social ramifications of a fossil-fuel driven economy.” Mark S. McCaffrey, co-founder of the Climate Literacy Network, Cooperative Institute for Research in Environmental Sciences (CIRES)

We have not identified any other institutions offering an undergraduate major that combines Climate Science and Policy to the extent proposed here. Regionally, the most similar programs are the climate track of the Atmospheric Science BS and the climate science minor at UW Seattle, neither of which require a policy component, the Environmental Policy degree at the Huxley College of the Environment, which has less emphasis on physical science, and programs at community colleges, which could feed into the proposed program. Nationally, there is an undergraduate minor at Montana State University and several masters programs combining climate, energy, and policy. These programs are described below, and illustrate the growing interest and demand for an undergraduate program in Climate Science and Policy.

A. Regional Schools

i. UW BOTHELL ENVIRONMENTAL SCIENCE

A Bachelor of Science degree in Environmental Science is offered by the Interdisciplinary Arts and Sciences (IAS) Program at UWB. This degree programs aims to develop the depth of scientific understanding, interdisciplinary perspectives, and creative problem-solving skills needed to design and bring about solutions to environmental problems. This program emphasizes ecology and biological science rather than physical climate science. In particular, this degree does not share the requirements for courses in mathematics and physics required in the proposed degree. Nevertheless, the CS&P major is a strong complement to Environmental Science degree, and several courses will be shared between the programs.

ii. UW SEATTLE

The University of Washington, Seattle, offers a BS degree in Atmospheric Science and a minor in climate science (starting AY 2011-12). The Atmospheric Sciences program has 45 majors and the Climate Science minor is projected to have 125 minors. Compared to the proposed degree, these programs are focused on the physical science dimension without the integrated requirements of energy and policy course work in the proposed program. The Climate Science and Policy program aims to have comparable academic rigor and foundational education in climate science as the Atmospheric Science degree, but substitutes policy and energy courses for some of the upper-division atmospheric science courses, particularly in the fluid dynamics of the atmosphere.

The table below summarizes common elements and differences between the Atmospheric Science BS and the proposed CS&P degree. At the foundational level, the proposed major requires chemistry, economics, and political science with slightly reduced requirements in calculus and physics. Mathematics courses beyond calculus are included in the major, but optional, and would be required of students taking upper-level electives in advanced mathematics or atmospheric dynamics. At the more advanced level, some courses in the Atmospheric Science major (Thermodynamics, Atmospheric Chemistry, and a laboratory) are optional. Other courses, especially in the fluid dynamics of the atmosphere (boundary layer meteorology, atmospheric motions) are replaced in CS&P by required advanced courses in energy and policy. A student could also take a more policy-oriented or more interdisciplinary track by reducing some of the optional mathematics and climate science courses in favor of engineering, social science, ecology, or human health courses.

The University of Washington, Seattle, has recently introduced a Climate Science minor. This minor allows cross-disciplinary study in the traditional core earth science disciplines (Atmospheric Science, Oceanography, and Earth and Space Science) emphasizing climate science concepts and integration of climate studies with physical science. The Climate Science minor requires one seminar course in integrated science. One social science or one energy elective may be counted toward the minor, but is not required. In contrast, the proposed CS&P degree requires at least four policy courses (20 credits) and one integrative course.

Western State BS	Climate Science and Policy BS	
MATH 124, 125, 126 (5,5,5) Calculus	B CUSP 124, 125 (126 optional) (5, 5)	
PHYS 121,122, 123 (5,5,5) Physics	BPHYS 121, 122 (123 optional) (5, 5)	
	BCHEM 142, 152, 162 Chemistry (5, 5, 5)	
CSE 142 (4): Introduction to Programming or AMATH 301 (4): Introduction to MATLAB	CSS 161 (5) Fundamentals of Computing	similar
MATH 324 (3) Multivariate Calculus	STMATH 324 Multivar Calc (optional) (5)	
AMATH 351, 353 (3,3) (ODE, PDE)	STMATH 307 Differential Eqns (opt) (5)	
STAT 390 (4cr)	BST 390 Probability and Statistics (5)	
ATMS 301 (5): Intro to Atmospheric Sciences	Fundamentals of weather and climate (5)	
ATMS 321 (3): Science of Climate	Climate analysis and modeling (5)	
ATMS 340 (3): Thermodynamics and Clouds	Economics and Political Science (10)	
ATM S 341 (3): Atmospheric Radiative Transfer	Energy and greenhouse gas management (5)	
ATM S 358 (3): Fundamentals of Atmospheric Chemistry	Atmospheric Chemistry and Physics (5) (elective)	
ATM S 370 (5): Atmospheric Structure and Analysis	BISLEP 302 Policy Analysis (5)	different
ATM S 431 (3): Boundary-Layer Meteorology	BCLIM 320 Impacts of Climate Change (5)	
ATM S 441, 442 (3,3): Atmospheric Motions I, II	Advanced Climate Modeling (elective) (5)	
ATM S 451 (5) Instruments and Observations	Governmental Response to Climate Change (elective) (5)	
None required	Capstone Project (5)	
87 total credits required	105 total credits required	

iii. HUXLEY COLLEGE OF THE ENVIRONMENT

The Huxley College of the Environment at Western Washington University offers several undergraduate degrees in environmental disciplines. The BA degree in Planning and Environmental Policy has some similar elements to the proposed degree in that it integrates physical science and policy studies. The Huxley College degree, however, is oriented much more strongly to policy studies and ecology than physical climate science. For preparatory courses, the Huxley degree does not require calculus, physics, or chemistry, and there are few requirements for upper-level science courses. Thus, in contrast to the UW Seattle degrees, which are more focused on the physical science dimension of climate change than the proposed degree, the Huxley College degree is more focused on the policy and human dimensions.

iv. CENTRAL WASHINGTON UNIVERSITY

The major in environmental studies at Central Washington University provides students with an understanding of the natural science of environmental issues as well as the social, political, and economic factors that contribute to policy and planning decisions. Through this major, students gain the necessary professional and technical skills for entry into successful environmental careers or for graduate studies in environmental fields. The major offers five specialization options in environmental biology, environmental chemistry, environmental geology, environmental geography, and environmental policy. The interdisciplinary major in public policy (BS) may be combined with the environmental studies specialization in environmental policy by completing the specific course requirements for both majors. Students who combine majors in public policy and environmental studies with a specialization in environmental policy will receive a Bachelor of Science degree in public policy and a Bachelor of Science degree in environmental studies. As with the UWB environmental science degree, this program emphasizes ecology and biological science rather than physical climate science. In particular, this degree does not share the requirements for courses in mathematics and physics required in the proposed degree.

v. COMMUNITY COLLEGES

The proposed degree is designed for community college articulation. All the regional community colleges offer the foundational courses in physical science and mathematics required for students to transfer into the proposed degree. Several also offer courses in weather and climate issues that could develop student interest in a climate science degree. In particular, Bellevue College has a Meteorology department and provides two courses, "Introduction to the Weather" and "Global Climate Change". Physical science students at Bellevue College planning to continue to a bachelor's degree, would be well prepared to enter the Climate Science and Policy program with these courses.

B. National Programs

Several national degree programs, all at the Master Degree level, are more similar to the proposed degree than existing undergraduate programs or other programs in the region. These

include degrees at Bard College, the Johns Hopkins University, and North Carolina State University Professional Master Program. While these are all Master degree programs, they illustrate the emerging recognition of the importance of a degree similar to the proposed Climate Science and Policy degree, especially as professional preparation in a growing market of climate-related jobs. As an undergraduate degree, the proposed program is designed to provide employment skills at the BS level or preparation for continuing graduate study.

i. JOHNS HOPKINS UNIVERSITY

The Johns Hopkins University recently formed an MS degree in Energy Policy and Climate with very similar objectives to the proposed program. The stated goal of the Johns Hopkins program is to “prepare the next generation of interdisciplinary professionals to address climate issues and sustainable energy systems. Graduates will be able to demonstrate an understanding of the science related to a changing climate and global warming, and develop a comprehension of energy production, delivery, and consumption for both traditional systems and sustainable/renewable energy alternatives.” The degree is built around four core courses (Energy Production Technology, Science of Climate Change and its Impact, Climate Change Policy Analysis, Carbon Management and Finance) and electives in topics such as Ecological Impacts of Climate Change, Climate Change and Human Health, Climate Modeling Techniques, and International Climate Change Policy. These are all key courses in the proposed curriculum.

ii. BARD CENTER FOR ENVIRONMENTAL POLICY

The Bard Center for Environmental Policy offers an MS degree in Climate Science and Policy. The program focuses on climate science, specializing in the interactions between climate change, ecosystems and agriculture. The Bard degree is a two-year program, which includes a required internship and a master’s thesis.

Table: Climate Science and Policy curriculum. New courses to be developed are in bold. Prerequisites are indicated in parentheses.

Level/Credits	Course Title
Foundation 100-200	BCHEM 142,152,162 General chemistry (3 quarters)
	BPHYS 121, 122 Physics (2 quarters)
	BCUSP 124,125 Calculus (2 quarters,)
	BCUSP 200 or 201 Economics (or equivalent)
	BIS 280 or 281 Political Science (or equivalent)
50 credits	CSS 161 Fundamentals of Computing (or other approved course)
Core 300-400	BCLIM 200 Intro to climate science and policy
	BST 390 Probability and Statistics
	BCLIM 300 Fundamentals of weather and climate (calculus, physics, chemistry)
	BCLIM 310 Energy and greenhouse gas management (chemistry)
	BISLEP 302 Policy Analysis or 301 Law, Economics, and Public Policy
	BCLIM 320 Impacts of Climate Change (multi discipline)
35 credits	BCLIM 410 Climate Modeling and Data Analysis (fund. weather)
	Any 3 of the following courses:
Advanced CS&P Electives	Multivariate calculus; Ordinary Differential Equations; Geographical Information Systems (GIS); Remote sensing; Advanced climate modeling; Atmospheric Chemistry and Physics ; Conservation & Sustainability Development; Issues in Environmental Policy; Governmental Responses to Climate Change ; Science, Expertise, and Public Policy; Climate and atmospheric chemistry lab ; Political Economy of Energy ; Sustainable Energy
15 credits	
5	BCLIM 488 Climate Science and Policy Capstone: Undergraduate research or Internship
105	Total credits in major
75	General Electives
180	Overall total credits

V. Proposed Curriculum

The requirements of the proposed Climate Science and Policy degree are (see Table above):

- Foundational courses in Math, Physics, Chemistry, and Computing. (currently offered at UW-Bothell and community colleges).

- Introductory courses in economics and policy studies (currently offered at UW-Bothell and community colleges)
- One course in statistics (currently offered at UW-Bothell and community colleges)
- A sequence of climate science courses: Fundamentals of Weather and Climate, Impacts of Climate Change, and Climate Data Analysis And Modeling (one currently offered)
- Energy and greenhouse gas management (currently under development)
- National and international climate policy
- Three upper-level elective courses in climate science, energy, or policy
- A capstone experience, either a research project or internship

The following sections describe required courses for the Bachelor of Science Degree in Climate Science and Policy. The first lists courses currently offered at UWB; the second describes new courses to be developed for the major.

A. Courses currently offered at UWB

Mathematics: 3 quarters

- Calculus I and II (BCUSP 124, 125)
- Statistics (BST 390)

Physics: 2 quarters of the calculus-based sequence:

- Mechanics (BPHYS 121)
- Electromagnetism and Oscillatory Motion (BPHYS 122)

Chemistry: 3 quarters, covering general chemistry

- General Chemistry (BCHEM 142,152,162)

Computing: 1 quarter

- Fundamentals of Computing (CSS 161).

Climate science: 2 quarters

- BCLIM 200 Introduction to Climate and Climate Change
- BCLIM 320 Impacts of Climate Change

Policy science and economics: 3 quarters

- 1 quarter economics (BCUSP 200/201)
- 1 quarter political science (BIS 280/281)
- 1 quarter advanced policy science (BISLEP 302 Policy Analysis or 301 Law, Economics, and Public Policy)

Advanced Electives: 15 credits

- BST 307 Introduction to Differential Equations
- BIS 342 Geographic Information Systems
- BST 445 Political Economy of Energy

- BPOLST 453/583 Issues in Environmental Policy
- BIS 446 Science, Expertise, and Public Policy
- BIS 459 Conservation & Sustainability Development

B. New courses to be developed

B Clim 300 Fundamentals of weather and climate (5 credits) (Prereq.: Calc I, II; Phys I, II)

This course will provide an introduction to the fundamental science of the atmosphere and climate system, covering the following topics: composition and structure of the atmosphere, clouds, thermodynamic processes, solar and terrestrial radiation, air motions, evolution and present state of earth's climate, the hydrologic cycle, atmospheric and oceanic energy transport, factors controlling climate change.

B Clim/BES 310: Energy and Greenhouse Gas Management, 5 credits (Prerequisites BCHEM 142,152,162)

In this course students will gain an understanding of fossil and non-fossil energy sources. The course will start with an overview of the type of emission sources (stationary, mobile, non-point) and a review of the chemical and radiative impacts of various greenhouse gases. At the end of the course students should know how to quantify carbon and other greenhouse gas emissions, develop strategies for reducing emissions and understand the regulatory requirements for reporting of emissions.

B Clim/BES/BIS 4XX: National and international climate policy, 5 credits (Prerequisites: Economics course, Policy course, BCLIM 200 Intro to Climate Science)

In this course students will gain an understanding of the national and international policy dimensions of the climate change issue. Students will learn the basic concepts applied in both national and international policy discussions around climate. This includes understanding the trade-offs and/or co-benefits from considering climate and economic impacts jointly. Students will participate in mock international negotiations and follow local, regional and national policy debates as part of their course work.

B Clim 410 Climate data analysis and modeling (5 credits) (Prerequisites: Fund. of Weather)

This course will cover the computational techniques of analyzing climate data and modeling the climate system. The analysis component will provide an overview of techniques of

spatiotemporal data analysis in the climate sciences including time series analysis, regression and correlation in two and three dimensions, and significance testing. The modeling component will provide a basic introduction to Earth system modeling addressing the atmosphere, ocean, and land-surface components and their coupled interaction. We will consider both global and regional climate modeling, model evaluation, and appropriate application of model projections. Includes computer laboratory.

BST 445 Political Economy of Energy. (5 credits) An energy policy course that covers issues of governmental energy policy in reacting to climate change.

BST 446 Sustainable Energy. (5 credits) an energy science/thermodynamics course focused on the science and engineering of energy and geared to students who've had one quarter each of calculus and chemistry.

BCLIM 488: Climate Science and Policy Capstone. (5 credits). This course will allow students majoring in the CS&P degree to conduct original research or work with a community partner in the CS&P field. Students will be guided by a faculty mentor and an additional mentor from within or external to the University. Students will also assemble a portfolio of work completed in the CS&P major. Prerequisite: Seniors in the CS&P major.

Additional advanced electives will be developed according to student demand. Likely courses include:

BCLIM 450 Atmospheric Chemistry and Physics

BCLIM 465 Advanced Climate Modeling

BCLIM 470 Climate and Chemistry Lab

BCLIM or BISLEP Governmental Response to Climate Change

Advanced Topics: Biogeochemical cycles, Ecological Systems, Human Health

C. Course track

The curriculum is designed to allow students with a general science background to be admitted after their Freshman year. Specifically, students may be admitted with a combined 20 credits of calculus (BCUSP 124, 125), physics (BPHYS 121, 122), and chemistry (BCHEM 142,152,162)

with an average grade of 3.0. The following is an example track for achieving all the required courses for the major, with admission requirements satisfied in the first year.

Freshman

Fall

1. Discovery core
2. BCUSP 124 Calc 1
3. BCHEM 142 Chem 1

Winter

1. Discovery core
2. BCUSP 125 Calc 2
3. BCHEM 152 Chem 2

Spring

1. Discovery core
2. BCHEM 162 Chem 3
- 3.

Junior

Fall

1. BCLIM 310 GHG
2. BCUSP 280 Political Science
- 3.

Winter

1. BCLIM 320 Impacts of Climate Change
- 2.
- 3.

Spring

1. BISLEP 302 Policy Analysis
2. BST 390 Statistics
- 3.

Sophomore

Fall

1. BPHYS 121 Mechanics
2. BCUSP 200 Economics
- 3.

Winter

1. BPHYS 122 Electricity and Magnetism
2. BCLIM 200 Intro Climate Change
- 3.

Spring

1. BCLIM 300 Fund of Weather and Climate
2. CSS 161 Fundamentals of Computing
- 3.

Senior

Fall

1. BIS 446 Science, Expertise, Public Policy
2. BCLIM 410 Modeling and Analysis
- 3.

Winter

1. BCLIM 465 Adv Climate Modeling
2. Capstone
- 3.

Spring

1. BIS 459 Conserv & Sust Development
- 2.
- 3.

VI. Infrastructure Requirements

A. Facilities

i. TEACHING LABORATORIES

All of the lower-division laboratory courses in the CS&P major are part of the existing S&T chemistry and physics curriculum. UW Bothell (UWB) offered courses in General Chemistry and Physics for the first time in AY 06-07, when the state granted us permission to enroll freshmen. Since that time, the enrollment in these courses has increased to approximately 500 students (2500 student credit hours) annually. We anticipate that many students who would otherwise have enrolled in these classes may choose to major in CS&P. Thus the new major will not place substantially greater demand on laboratory resources for these classes. For one upper-

division class proposed (BCLIM 450 Atmospheric Chemistry and Physics), we anticipate requiring lab space for up to 10 additional students per year initially, more as the program grows. These students could be accommodated in the existing lab space that now houses the advanced instrumentation these students will use (e.g. FTIR spectrometer)

Lower division classes are currently using the teaching laboratories that are shared with Cascadia Community College (CCC), and are located in a CCC academic building on the shared UWB/CCC campus. However student demand for the Science classes has required us to develop new laboratory space. This new laboratory space is being leased in the Bothell Professional Building, located adjacent to the campus. This space has provided new teaching and research laboratories (3500 sq ft) for a variety of Engineering and Science programs, within the Science and Technology Program at UWB. This leased facility, occupied in March 2011, is intended to fill the space gap until UWB builds its first science building (UWB-3). The UWB-3 building design was completed in 2011 and funding for construction is included in the UW Capital Budget Request. The new science building is designed to provide approximately 15,000 square feet of laboratory space for teaching and research, which would accommodate the long-term growth we anticipate in the CS&P major.

ii. COMPUTING FACILITIES

To support student and faculty research in climate science, particularly climate modeling and analysis, high-performance computing facilities will be required. The current best option for research is the Hyak cluster. Hyak is a shared, high-performance computer cluster dedicated to research computing at UW. Developed in a partnership between the eScience Institute and UW-IT, it is intended to provide a convenient, flexible, and cost effective alternative for UW faculty, students, and staff who might otherwise have had to build and operate their own high-end computer systems. Participating academic units invest in a common high-performance infrastructure shared across the entire system while individual users fund the purchase of nodes configured according to their specific requirements. Investment in Hyak infrastructure would ensure support for new climate research at UWB.

To support student research, we are collaborating with CSS to develop scientific workstations and a local computer cluster to support data analysis and modeling projects. These systems would support the software and computing performance required for student projects.

B. Support Services

As other S&T programs are implemented in tandem with the CS&P program, specific support services to meet the needs of science and technology will need to be developed. In any case, S&T students, including CS&P majors, will place greater demands on the Quantitative Skills Center.

i. ACADEMIC TRANSITION PROGRAM

The University of Washington Bothell started the Academic Transition Program in September 2009; the objective of this bridge program is to help talented but under-prepared students of promise to make the transition to college-level coursework. The program runs four days per week from 9 am to 4 pm, providing intensive concentration in areas such as university culture and resources, study skills, writing and quantitative skills, as well as co-curricular activities. The program continues as a follow-up throughout the year. College credits are awarded to students for participation in the program.

ii. COUNSELING SERVICES

Confidential, short-term personal counseling is available to UW Bothell students free of charge. Students may utilize counseling for a wide range of personal concerns such as anxiety, depression, relationship difficulties, or adjustment issues. All services are offered in a safe and supportive environment.

iii. DISABLED STUDENT SERVICES

The University of Washington Disability Support Services office (DSS) is committed to ensuring that qualified students with documented disabilities are provided with an equal opportunity to participate in the variety of educational, recreational, and social opportunities available at the University. The primary functions of DSS are academic accommodations for students with a

documented, permanent or temporary physical, mental, or sensory disability; resource and referral information; and advocacy support as necessary and appropriate. Academic accommodations for each student are determined on an individual basis with input from the diagnostician or physician (usually from the diagnostic report), the student and the Counselor or Director of the DSS office.

iv. LIBRARY

UW Bothell Library is part of the University of Washington Libraries system, which provides access to over seven million volumes, over 50,000 serials, and hundreds of research databases. Reference services are available during regular library hours and 24/7 through online chat. One of the main features of the UW Bothell Library is an Information Commons, which offers 50+ computer workstations, providing access to UW Libraries research databases, other online resources, and a limited suite of productivity software. Rob Estes, Science Librarian and Sarah Leadley, Director of the Library, provided the following analysis of the support requirements and services already in place to support the CS&P program, as well as additional resource needs.

a) Collections: Research Databases, E-Journals, monographs and media

UW Bothell CS&P students will have access to core databases and electronic resources through the UW Libraries. The key electronic resources for research in CS&P are listed on the UW Atmospheric Science and Political Science research guides (see <http://guides.lib.washington.edu/atmos>) and includes online access to all major journals. As electronic database subscriptions increase and UW Bothell use of CS&P databases increases, UW Bothell will need to contribute a higher level of funding to continue receiving unlimited access to these major databases. It is also anticipated that tri-campus and consortial costs will increase over time, based on inflation, which tends to be high in the sciences. Additional funds will be needed to purchase books and media to support classroom instruction and student research needs in climate science and energy issues.

b) Student Support: Information Literacy

Highly prepared as well as underprepared students need librarian support to access, use, and critically evaluate essential science resources and databases. Based on the current level of support given to UW Bothell undergraduate students in related STEM fields, CS&P students will

need support from librarians in terms of reference and resource questions (via email, Chat Reference, and in person) and some information literacy instruction (in person or through online instruction) on library research basics, key electronic and print resources, and specialized research skills. In alignment with the goals of the UW Bothell Science and Technology program, student access to research librarians is necessary to foster student preparation, retention and achievement.

c) Proposed budget for library resources and services

	2014-15	2015-16	2016-17
Start-up Collections	2,000		
New Faculty Teaching & Research Needs @ 2 faculty	2,000	2,000	
Ongoing Collections* with 12% annual inflation	10,000	11,200	12,544
Operating Expenses			
Staff Computer (assuming 4 year equip. replacement)	1,200		
Includes librarian travel and supplies	2,000	2,000	2,000
Operations Totals	17,200	13,400	14,544
Staffing: Salary & Benefits**			
.25 Librarian	16,700	17,535	18,412
Student hourly	2,000	2,100	2,205
Staffing Totals	18,700	19,635	20,617
Grand Totals	35,900	33,035	35,161
			37,697
			40,466

***Ongoing/Permanent Collections:**

- o \$2,000 for monographs and media
- o \$8,000 for increased contributions (@5%) to core electronic resources: research databases and ejournals (includes funding for SciFinder Scholar)
- o \$2,000 one-time costs: purchase books and media in areas with little or no representation in the Bothell Library collection, including atmospheric chemistry, climate policy, thermodynamics and climate modeling.

Inflation for collections is calculated at 12% annually, which may be a low estimate for science journals and e-resources. Additional database seats and increases in consortia agreements could raise costs by an additional 15-20%.

****Benefit Load Rates:** 01-70 Professional Staff: 33.6% Salary and benefits includes possible 5% annual increase; does not include merit increases or librarian promotion.

Library staffing costs will need to be reviewed based on increases in FTE, and may include Access Services, Reserves and/or Technology staff.

v. MEDIA CENTER

The Campus Media Center (CMC) provides a variety of services to UW Bothell students, faculty and staff. In addition to maintaining and circulating the local media collection, staff members also provide media research and procurement services. The CMC also assists in the development

of media-related materials for instruction and provides training to faculty and students in the use of media and technology. Additional services include audio and video production as well as photographic and digital imaging production. The CMC also provides support to UW Bothell's highly technical classrooms. Each room is equipped with state-of-the-art instructional technology including an electronic podium with an on-board instructor, computer and media playback devices. Finally, the CMC coordinates the distribution of cable television throughout the instructional areas of the campus.

vi. QUANTITATIVE SKILLS CENTER

The Quantitative Skills Center is a peer tutoring center open to anyone who wants academic support with a quantitative question or analysis for one or more of their classes, and as an open, quantitative studying and learning center.. The QSC offers free tutoring, workshops, and in-class presentations for all UW Bothell students, staff, faculty, and alumni. As the CS&P program grows it will be necessary for student support services, such as the QSC, to receive additional resources to be able to continue to provide high-quality support.

vii. WRITING CENTER

The UW Bothell Writing Center supports student writing in all academic programs by providing individual and group consultations (face-to-face and online), workshops, and classroom instruction. The WC will assist a student through the entire writing process. This includes organization, research, conducting reviews and the revision process.

viii. INFORMATION TECHNOLOGIES

The University of Washington Bothell provides a broad array of computing resources and services to all students, staff and faculty. The Information Technologies Office provides basic computing support to UW Bothell faculty, staff, and students. It maintains computer classroom and labs, provides technical assistance to faculty for both teaching and research, databases, educational technology efforts, and administrative access to information and maintains a robust, secure and stable networking environment providing e-mail, file storage, and back-up services.

VII. Faculty

A. Current Faculty

There are currently four faculty members within the UW Bothell Science and Technology Program (S&T) with specific expertise and interest in Climate Science and Policy and who will have primary responsibility for the proposed degree. Their areas of expertise are listed below:

- Daniel Jaffe has expertise in global and regional air pollution, especially carbon monoxide, ozone, nitrogen oxides, aerosols, mercury and other metals. In 1997 his research team discovered that Asian air pollution could be transported across the Pacific in as little as 6 days and this work has been widely cited. His research at UWB focuses on the intersection between climate, energy and air pollution and consists of post-doctoral fellows, graduate students and undergraduates, all working together to address these questions.
- Eric P Salathé Jr. conducts research on the impacts of climate change on human and natural systems and regional climate modeling. Through the UW Climate Impacts Group, his research supports climate impacts applications in many fields including air quality, hydrology, agriculture, and human health. His current research focuses on how local weather and land-surface processes can affect the regional response to climate change.
- Charles Jackels's research has focused on the application of large-scale computational science methods to chemical and physical problems involving the ground and excited state properties of small molecules, especially those that are of importance in Earth's atmosphere. These studies employed large-scale CASSCF, configuration interaction, and perturbation theory calculations
- Steven Collins's research aims to better understand the relationship between regional, national, and global political economies in shaping technological development and competitive advantage in high technology industries. Active projects include the comparative study of biotechnology, focusing on Japan and the U.S., and regional and small business policy in Japan. These efforts unite around a common question: to what extent can regional or national policies shape technological development, given technological constraints, conditions in the international economy, firm and industry organization, public perceptions, and the nature of policy making institutions.

Additional faculty in Interdisciplinary Arts and Science (IAS) with expertise in policy and environmental science will teach key courses in the CS&P degree and will assist in designing the policy component of the degree. These collaborating faculty include:

- Policy Faculty:
Nives Dolšak (Environmental Policy, International Regimes, Policy Analysis)
Gwen Ottinger (citizen science, environmental justice)
Keith Nitta (Education Policy, Comparative Politics, Leadership and Management)

- Environmental Science Faculty:
Warren Gold (Ecology, Environmental Science, Restoration Ecology)
David Stokes (Conservation Biology, Animal Ecology, Conservation Planning)
Martha Groom (Conservation of Biodiversity, Ecology, Plant-Animal Interactions)

B. New Faculty

The climate science degree builds largely on existing UWB faculty. However two hires will be essential as the major grows and develops:

Chemical modeling, interpretation, or remote sensing of chemical and climate data: This person will be able teach upper division courses in the CS&P major (e.g. BCLIM 200, 300, 310, Atmospheric Chemistry and Physics) as well as contribute to the lower division teaching in chemistry and/or physics. Their research will be relevant to the physics or chemistry of the climate system.

Climate Policy: This person will be able to teach upper division courses in the CSP major (e.g. BCLIM 200, climate policy, environmental policy) as well as contribute to lower division teaching in policy, government and economics. Their research will relate to some aspects of climate policy or governmental responses to climate change.

The following will apply to the recruitment and hiring of new faculty members in the CS&P degree program:

1. We will hire new faculty members through national searches, by advertising in professional journals: Science, The Chronicle of Higher Education, and additional journals as appropriate for specific sub-areas.
2. We will strive for faculty expertise in various areas of CS&P, placing priority on the hiring of excellent educators and scholars with expertise in their sub-discipline, with the goal of providing outstanding educational and research experiences for students across the breadth of climate science and policy sub-disciplines. In hiring faculty, we will also seek candidates whose teaching will fit with the interdisciplinary nature of a UW Bothell education.
3. We will solicit applications from candidates from historically under-represented groups in the sciences by routinely contacting historically black colleges and universities and tribal colleges to publicize our searches. We will also post job ads on the web sites for SACNAS, HBCU, and other appropriate web sites.
4. The mission of the Office of the Associate Vice Provost for Faculty Advancement (working in UW's Office of Minority Affairs and Diversity

- [OMA&D]) is to ensure that UW recruits, promotes and retains an excellent and diverse faculty. We will work with OMA&D to attract a pool of applicants that includes women and members of under-represented groups.
5. Program materials and web photos will reflect and promote the diversity of the program.

VIII. Administration

The CS&P degree program will be housed in the Science and Technology Program at UW Bothell (programs are academic units at UW Bothell, similar to departments at UW Seattle).

A. Administrative Structure

The Director of the Science and Technology Program (S&T) will appoint a CS&P Degree Coordinator. The CS&P Degree Coordinator will work with the Director of S&T to oversee CS&P course offerings (including all courses required for the CS&P degree) – to determine both which courses will be offered and the frequency of offerings. The CS&P Degree Coordinator will work CS&P faculty as well as the existing S&T Curriculum Committee to seek approval for changes in any courses, as needed. The Degree Coordinator will be responsible for overseeing CS&P committees, and making recommendations to the appropriate S&T committees about the CS&P curriculum, staffing, admissions, and assessment.

B. Committees

The CS&P faculty will serve as a curriculum and review committee. They will meet regularly to review the curriculum and evaluate CS&P student's progress through the program. This committee will also evaluate courses as possible CS&P electives (either adding or deleting courses), determine standards for admission to the CS&P major, and review applications to the major. The focus of the Curriculum Committee will be on achieving the CS&P learning objectives.

C. Support Staff

The S&T Program currently has a Program Administrator (Christine Howard) and an adviser (Sharon Meriwether), who serve all degree programs within S&T.

IX. Students

A. Diversity Plan

The proposed CS&P program is committed to recruiting and educating a diverse student population. To a greater extent than many STEM programs, diversity will be important in achieving the educational goals of the program as students will need to understand diverse perspectives in order to successfully work in the area of Climate Science and Policy. Similarly, the multidisciplinary and applied nature of the program will likely appeal to a broader range of students than traditional disciplinary STEM majors. The UW Bothell has been extremely successful at matriculating students from under-represented groups, making it the most diverse campus in the UW system, which will aid CS&P in achieving program-level diversity. Existing S&T degree programs have contributed to campus diversity by participating in these UWB wide Pre-college and K-12 programs:

Dream Project: This is a student-initiated high school outreach program that operates as a University of Washington Bothell course, partnering UW Bothell students with first-generation and low-income high school students to help them achieve the dream of attending college. The program's dual-focus approach strives not only to help these high school students, but also to teach UW Bothell students about important social issues through a unique, hands-on experience

Imagine Summer Camp: Middle and high school age students will come to University of Washington Bothell campus for a week long summer experience, exploring environmental sustainability thru hands-on activities.

B. Services for pre-majors

The needs of lower-division students will be met through specific activities directed to developing the skills and interests required for students entering the Climate Science and Policy major:

1. Peer mentoring
 - The Climate Science and Policy program will have a structured program pairing upper division students with lower division students.
2. Program Support
 - There will be directed support for lower division students to apply and engage in STEM research and summer programs like the NSF Louis Stokes Alliances for Minority Participation (LSAMP) Program, the UW Multidisciplinary International Research Training (MIRT), and the UCSD Summer Training Academy for Research in the Sciences (STARS).

3. Curriculum & Course Support

- Expand introductory STEM course offerings that appeal to students with different levels of preparation or background. Align academic support structure and involvement for students.

X. Assessment Plan

The University of Washington mandates reviews of all academic units, including undergraduate degree programs, at least every ten years; more frequently for new degree programs. These reviews are conducted jointly by the Dean of the Graduate School and the Dean of Undergraduate Academic Affairs (<http://www.grad.washington.edu/fac-staff/programreviews/existing.shtml>).

Four years after start-up of the CS&P major, the S+T program will appoint a Climate Science and Policy Assessment committee to evaluate the overall success of the program. This will provide data to evaluate whether we have met the program goals and whether our initial students are successful upon leaving the program.

Our assessment will rely on:

- Student feedback on classroom relevance.
- Student feedback from the Climate Science and Policy capstone project.
- Stakeholder feedback on our students from the Climate Science and Policy capstone project.
- If there are graduates already in the workplace, then we will request feedback from their employers on training, job performance and initial knowledge of the field.

Specific assessment measures include the following:

- Student evaluation of each course.
- Peer monitoring of instruction, through classroom visits, allowing faculty members to better understand both what other courses cover, and the teaching styles used by other instructors.
- Course-embedded assessment: student performance on exams, lab exercises, papers, and presentations, and overall course grades.
- Student focus groups and exit interviews, which provide long-term longitudinal data.
- Surveys sent to alumni and their employers 3-5 years after graduation.
- Tracking of program alumni.
- Specific outcomes that we will quantify are: Success of student-faculty research, number of presentations at conferences, number of student co-authored abstracts and publications, monitoring of student retention within the program, to evaluate (among other things) student

preparation for the program, admission requirements, and the effectiveness of student support services, number of students admitted to advanced professional degree programs, number of students admitted to PhD programs, number of students employed (or pursuing further education) in CS&P

- After 10 years, the program will be evaluated by an outside faculty evaluation group. One such group that provides evaluation of academic programs is the Council for Undergraduate Research (CUR). CUR has established specific guidelines, and provides a list of potential outside evaluators who will visit the campus, interview students and faculty, and review material assembled by the degree program, in order to both evaluate the program and to recommend changes visit: <http://www.cur.org/consulting.html>.

Data collected will be analyzed by the S+T Assessment Committee, and used to evaluate the overall effectiveness and success of the program and to recommend changes in program instructional practices, content, curriculum or other applicable areas. Complementary faculty committees will evaluate curriculum and resources (support staff, budget and equipment).

Tri Campus Comments:

Bothell: Bachelor of Science degree in Climate Science and Policy (BST-20120308)

uwcr
uwcr
Board owner

New! Posted Mar 30, 2012 8:36 AM

Please review the attached 1503 pdf requesting to establish a Bachelor of Sciences degree in Climate Science and Policy at the Bothell campus and post comments by 5:00 pm on Friday, April 20th.

If you have any problems viewing the attachment or need disability accommodationsn, please contact the University Curriculum Office at uwcr@uw.edu.

Attachments:



BST-20120308.pdf 28.6M Download View

rstanton
ROBERT B STANTON

New! Posted Mar 30, 2012 8:19 PM

I support this proposal. Although I am not a scientist, I have learned that according to Scientific American and other equally reputable sources, most contemporary scientists agree that anthropogenic global warming is an extremely serious problem. This view is "controversial" in the sense that it is often publicly attacked, but not in the sense that leading scientists doubt its validity.

Robert Stanton, Associate Professor Emeritus (English)

rjjense
RYAN JENSE

New! Posted Apr 2, 2012 10:24 AM

I strongly support this proposal on many levels.

1) Climate research and further social understanding of its local and global impacts are paramount for the future of the US and the world.

2) A combination of Climate Science and Policy is an excellent way to further progress of a Clean Energy Future. (As far as I can tell, the combination of the two is a novel approach within the UW system).

3) The State of Washington, the US, and the world, will benefit

from a bolus of students energized to pursue a better cleaner future.

4) While the fossil fuel chapter is on its final pages, we will need more and more of the proposed workforce to ensure a safe and better clean energy future.

5) A transition away from fossils towards clean renewables IS the future, and it seems this proposal captures this understanding.....While an understanding of the Science is important, so too is the ability to transition these ideas at the Policy level.

A side note: On the Clean Transportation front, I might draw your attention to ET3 (Evacuated Tube Technology) as a possible area of focus for some of your students. This seems like it has some real potential for impact...perhaps WA State gets involved in this..

-Ryan Jense, (Global Health)

luanne
LUANNE THOMPSON

New! Posted Apr 20, 2012 5:07 PM

This is an ambitious program and it is great that UWB is going ahead to try to link climate and social sciences. I do think that there are several things that could be done to strengthen the program. Right now, the core science faculty are both atmospheric scientists, and I was surprised that they propose that the next hired should be an atmospheric chemical modeler. The program would be stronger if they broadened their faculty more to include more areas of earth system sciences to really give the students broad knowledge in climate science.

I think that it is going to be unlikely that they will reach their target numbers. Atmospheric Sciences on the seattle campus has a pretty small undergraduate population, and the proposed major is fairly similar to that major and is almost as quantitative. For instance, having two classes in modeling/data analysis seem quite ambitious given who their students will likely be. A modeling class for undergraduates has been taught on the UW campus, and it didn't have a very high turn out. If there was some way to get this major an engineering designation, that would probably draw more students, but given that it is not engineering, but still fairly quantitative, I think that their numbers will be quite a bit smaller than projected.

UNIVERSITY CAMPUSES UNDERGRADUATE PROGRAM REVIEW PROCEDURES**

CHECKLIST

Title of Proposal: Bachelor of Science degree in Climate Science & Policy
(BST-20120308)

Proposed by (unit name): Science and Technology

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:

03/26/12 Date proposal received by originating campus's review body

03/28/12 Date proposal sent to University Registrar

03/30/12 Date proposal posted & email sent to standard notification list

05/02/12 Date of originating campus's curriculum body approval

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

B. 3 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: William Erdly

5/22/12 Date request for review received from University Registrar

5/28/12 Date of FCTCP report

B. Review (attached)

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)

Three comments were submitted; they were supportive and/or informational. Additional comments from UWS were received after the three week open comment period. These comments will be forwarded to the sponsoring program to review and provide responses as needed. FCTCP recommends follow-up between the departments – and will facilitate discussion should it be 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