UNIVERSITY OF MARY WASHINGTON – PROGRAM CHANGE PROPOSAL
Electronically submit this completed form with attachments in one file to the Chair of the College Curriculum Committee.

<table>
<thead>
<tr>
<th>COLLEGE (check one):</th>
<th>Arts and Sciences</th>
<th>Business</th>
<th>Education</th>
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<tr>
<td>Proposal Submitted By:</td>
<td>Joseph Nicholas</td>
<td>Date Prepared: 2/11/15</td>
<td></td>
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<tr>
<td>Department /Program:</td>
<td>Geography</td>
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Note: for any program change entailing the addition any new courses, or revisions to existing courses, separate proposal for those course actions must also be submitted.

PROPOSAL TO CHANGE EXISTING PROGRAM (check no than one of the following)

- Revise requirements for existing major
- Revise requirements for a concentration within an existing major
- Revise requirements for an existing degree program
- Revise requirements for existing certificate program
- Revise requirements for existing minor

Implementation Date: FALL semester, year:

REQUIRED ATTACHMENTS FOR CHANGES TO EXISTING PROGRAMS:

1. Rationale statement (Why is this program change needed? What purposes will it serve?)
2. Impact Statement (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of the program change are required.)
3. Catalog Copy (Provide the existing Catalog Description and the complete statement of the proposed new Catalog description that reflects the program changes)

PROPOSAL TO CREATE NEW PROGRAM NOT REQUIRING STATE ACTION
(check no more that one of the following)

- New concentration within existing major
- New minor
- New Major but NOT a new degree*

Implementation Date (semester and year): Fall 2015

REQUIRED ATTACHMENTS FOR NEW PROGRAMS NOT REQUIRING STATE APPROVAL:

1. Rationale statement (Why is this additional program needed? What purposes will it serve?)
2. Impact Statement (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of adding the new program are required.)
3. Catalog Copy (Provide the complete Catalog Description for the proposed new program)

Department Chair Approval: __________________________ Date: 2-11-2015
CCC Chair Approval: __________________________ Date: 3/11/15
Dean Approval: Richard Finkelstein Date: 9/17/15
UCC Chair Approval: Patricia Reynolds Date: 10/5/2015

*Provost Approval: __________________________ Date:
*Required only in cases of proposals for new concentrations, new minors, or new majors that do not involve a new degree
Proposal for a Minor in Climate Science

Rationale:

Climate science is a rapidly developing field of study, and is especially relevant today as humans have increasingly caused alterations to the composition of the atmosphere and to earth surface processes. The present atmosphere evolved with the advent of living organisms, and our climate system is kept in balance by a complex set of interactions among the biosphere, lithosphere, hydrosphere, and atmosphere. If the effects of human activity on climate are to be correctly assessed, that assessment hinges on an understanding of these interactions.

This minor is designed to fill a gap in the important field of climate and climate change that exists with respect to programs currently offered in the College of Arts and Sciences at the University of Mary Washington. The understanding of the causes of climate change is generally lacking among the public, yet enormous decisions are being made by governments and businesses based on climate science. These decisions obviously have far-reaching implications, affecting livelihoods and quality of life, and having sociological, moral, and philosophical ramifications. A climate science minor allows students to focus on various aspects of the field of climatology within a variety of majors.

Climate science is inherently interdisciplinary, involving both the physical and biological sciences. However, there is flexibility within the minor for some specialization, depending on the student’s major interests. Climatologists come from the ranks of geologists, oceanographers, geographers, biologists, chemists, physicists, and meteorologists. The commonality among these disparate fields is that they all inform us about the earth’s ability to absorb and radiate energy, and the way atmospheric processes play out across the earth’s surface. This minor would serve students who might be going on to graduate work in one of the subfields of climatology or those who wish to be more informed in ongoing debates about climate change.

Requirements for the Climate Science Minor
Sixteen to eighteen (16-18) credits.

Required courses:
- GEOG 110 – Introduction to Weather and Climate (4)
- GEOG 325 – Dynamic Climatology (3)
- GEOG 327 – Climate Change (3) or EESC/GEOL 355 – Icehouse – Greenhouse Earth (3)

Two or more electives from the following, totaling at least six (6) credits, with at least one course at the 300-level:
- BIOL 210 – Introduction to Ecology and Evolution (3)
- CHEM 331 – Environmental Chemistry (3)
- GEOG 111 – Landform Processes (4)
- GEOL 112 – Evolution of the Earth (4)
- EESC/GEOL 210 – Oceanography (3)
- EESC 230 – Global Environmental Problems (3)
- EESC/GEOL 325 – Environmental Geochemistry (4)
- GEOG 245 – Environment and Society (3)
- GEOG 326 – Glacial Processes and Landscapes (3)
- PHYS 201 – Thermodynamics and Statistical Mechanics (3)
The three required courses both focus on the atmosphere and surface/atmosphere interactions. These courses are therefore foundational.

Elective courses are selected on the basis of those that give specific insights into
1. processes that control the composition or history of the atmosphere (BIOL 210, CHEM 331, EESC/GEOL 210, 325),
2. the physics of the atmosphere or surface-atmosphere interactions (GEOL 112, EESC/GEOL 210; PHYS 201),
3. the role of climate in directing earth-surface processes (GEOG 111, 326, GEOL 112, EESC/GEOL 210)
4. human-environmental aspects of climate (EESC 230, GEOG 245)

Impact Statement

The proposed minor needs no additions to the existing infrastructure. The minor simply organizes a set of preexisting courses in one or more subfields of climate science.

Catalog Copy

Climate Science Minor
Climate science is inherently interdisciplinary, involving both the physical and biological sciences. However, there is flexibility within the minor for some specialization, depending on the student’s major interests. Climatologists come from the ranks of geologists, oceanographers, geographers, biologists, chemists, physicists, and meteorologists. The commonality among these disparate fields is that they all inform us about the earth’s ability to absorb and radiate energy, and the way atmospheric processes play out across the earth’s surface. This minor would serve students who might be going on to graduate work in one of the subfields of climatology or those who wish to be more informed in ongoing debates about climate change.

Requirements for the Climate Science Minor
Sixteen to eighteen (16-18) credits. Three required courses: GEOG 110, 325, and either GEOG 327 or EESC/GEOL 355. Two or more electives from the following, totaling at least six (6) credits, and at least one course at the 300-level: BIOL 210; CHEM 331; EESC 210, 230, 325; GEOG 111, 245, 326; GEOL 112, 210, 325; PHYS 201.
Notes on the status of this version (v.5) of the proposal as of 2-18-15
An earlier version of this proposal was submitted to the CAS Curriculum Committee, where it was passed with changes: moving GEOG 327 / EESC/GEOL 355 from electives to required courses because the earlier version lacked sufficient courses at 300-400 level. The minor was rejected by UCC. From the minutes of the Feb. 11, 2015 CAS Curriculum Committee:

“The climate science minor was rejected by UCC because it did not have enough credits at the 300-level. One of the required courses is not offered very frequently, and one sets [sic] of options are introductory physics courses which are said to have no climate science at all. The proposal is rejected with a suggestion that it be re-submitted after more collaboration with the other departments from whose offerings the minor is drawn.”

1. “The climate science minor was rejected by UCC because it did not have enough credits at the 300-level.”
That condition is met in this version.
2. “One of the required courses is not offered very frequently ...”
GEOG 110 is offered every fall semester. GEOG 325 and 327 are offered every other year in the spring and fall respectively. EESC/GEOL 355 is planned to be taught every other year. (From Chuck Whipkey, Feb. 6 email: “I just talked to Neil, and the plan going forward is to offer EESC/GEOL 355 alternating years, so anyone minoring in Climate Science should be able to schedule the class.”)
3. “... and one sets [sic] of options are introductory physics courses which are said to have no climate science at all.”
PHYS 105/106 has been replaced with PHYS 201, as recommended by George King (email, Feb. 5): “Frankly, the advanced mechanics and thermodynamics courses in physics [PHYS 201 – Thermodynamics and Statistical Mechanics] are better suited for your purposes...”
4. “The proposal is rejected with a suggestion that it be re-submitted after more collaboration with the other departments from whose offerings the minor is drawn.”

Subsequent email exchanges:

From: Joe Nicholas (jnichola)
Sent: Friday, February 13, 2015 8:39 AM
To: Andrew Dolby (adolby); George King (gking); Leanna Giancarlo (lgiancar); Chuck Whipkey (cwhipkey)
Subject: Climate Science minor

Dear Chairs,

At the risk of wearing out my welcome, may I ask once more for your indulgence on the Climate Science minor? I spoke with the chair of the College Curriculum Committee, Dawn Bowen, Wednesday evening, and she relayed to me the decision of the committee to reject the proposal. My understanding is that the committee was looking for the introductory physics course to be replaced by a higher-level course that would be relevant (e.g. PHYS 201 - Thermodynamics and Statistical Mechanics (3)), and I thought that that would be a perfectly acceptable change.

Since we are back to this stage in the process, however, I also think that it would be a good opportunity to make sure that all of the relevant faculty (i.e. those teaching courses included in the current proposal (see attachment), and those who are teaching courses you think might be relevant to the minor) are included in the discussion. So please pass this along to your faculty so that we can make sure that everyone who has a stake in this is involved.

I am not looking to do a wholesale revision of the minor, but I am interested in your thoughts concerning electives.

Thank you so much for your input and support. I think that the process so far has actually been very beneficial.
From: "George King (gking)" <gking@umw.edu>
Subject: Re: Climate Science minor
Date: February 13, 2015 11:05:34 AM EST
To: "Joe Nicholas (jnichola)" <jnichola@umw.edu>

Hi Joe,

This is more in line with my original email.

From: "Andrew Dolby (adolby)" <adolby@umw.edu>
Subject: RE: Climate Science minor
Date: February 13, 2015 1:43:44 PM EST
To: "Joe Nicholas (jnichola)" <jnichola@umw.edu>, "George King (gking)" <gking@umw.edu>, "Leanna Giancarlo (lgiancar)" <lgiancar@umw.edu>, "Chuck Whipkey (cwhipkey)" <cwhipkey@umw.edu>
Cc: "Alan Griffith (agriffit)" <agriffit@umw.edu>, "Abbie Tomba (atomba)" <atomba@umw.edu>

Hi Joe,

Thanks to Chuck and Leanna for their work on this proposal from our end here in Jepson. I have no objection to including BIOL 210 as an elective. First, the course covers ecosystems ecology, which includes the hydrologic and carbon cycles. Second, it covers the climatic factors that drive global distribution of biomes. Finally, we work responses of organisms to climate change into our population, community, and behavioral ecology lessons. So, it should augment the required courses in the minor for students who elect to take it.

I have copied Alan and Abbie, the other two faculty who regularly teach BIOL 210, so that they can weigh in.

Thanks,
Andrew

From: "Leanna Giancarlo (lgiancar)" <lgiancar@umw.edu>
Subject: RE: Climate Science minor
Date: February 13, 2015 3:24:15 PM EST
To: "Joe Nicholas (jnichola)" <jnichola@umw.edu>

Dear Joe,

I forwarded the proposal to Charlie again, and he's still on board with his course as an elective.

Best wishes,
Leanna

These are all of the emails I have received since sending my email of Feb. 13. (-JN, 2-24-15)