2016 LARC 2.0 Proposal

A Revised Environmental Science Curriculum: Inspiring Scholarly Inquiry

1. Participant(s) and their departments

   Karen Arabas - EES
   Joe Bowersox - EES
   Mindy Butterworth - EES
   Katja Meyer - EES
   Scott Pike – EES

2. Type of curriculum innovation (inquiry-based module, redesigned course, program revision)

   Program Revision

3. A 500-word statement about the proposed curricular innovation:

Courses involved

All courses in ENVR and ERTH, plus POLI304W and POLI341 are part of our program revision.

Narrative and Goals

The Environmental and Earth Science (EES) faculty share a common commitment to shaping graduates (in both our major and across the CLA) who are scientifically and socially literate, well versed in integrative and interdisciplinary systems thinking, have significant experience with discovery-based research (NAS 2015), and whose toolbox includes critical thinking, quantitative, written and communication skills necessary for both professional success and responsible citizenship. Our curriculum, however, does not adequately reflect this vision. Although we have tinkered with it, our curriculum has not been substantially revised since 2002. During this time period EES and the University have experienced significant change: our tenure track faculty has increased from 3 to 5, our majors have doubled (70 majors), our resources have grown (external research grants, Dempsey endowed chair and scholarship, etc.), and our new University Strategic Plan directs us to develop greater field and community-based learning, all of which enable us to put scholarly inquiry at the heart of our curriculum. As would be expected in the face of all this change, our program objectives and curriculum have lost their overarching coherence and they lack intentional scaffolding, particularly with respect to being able to provide our majors (and other CLA students engaged in our general education courses) with a clear approach and research-rich experiences.

Our LARC proposal will help support Phase III (May 2016-May 2017) of a multi-year effort to enhance and improve the EES curriculum so that it better aligns with our departmental and CLA goals. In 2013 we initiated Phase I with a self-study, the results of which helped guide our hiring of 2 tenure track faulty specializing in climate change: a geoscientist and medical geographer. In Fall 2015, with our new colleagues in place we initiated Phase II, conducting basic course mapping to better understand our current curriculum. In November 2015, we began to redevelop our identity, focus, and mission, through a two-day, intensive workshop on program envisioning and design facilitated by the National Association of Geosciences Teachers (NAGT). Using a backward design approach, we developed 1) a draft statement of how the systems approach guides our program, 2) a set of program learning outcomes (PLOS), and 3) a draft SWOT analysis examining internal and external factors that may help or hinder these outcomes (drafts of these documents available upon request). In December 2015 and January 2016 we finished our SWOT analysis and created a work plan for undertaking our program design and revision (Phase III), buoyed by the approaches and tools we learned at the NAGT workshop. Our program design and revisions will focus on appropriate scaffolding of content and research skills in order to better prepare our students for their senior capstone course and summer research opportunities, while also providing non-majors and majors with the tools to be responsible consumers of environmental information in part through engagement in research, field experiences, and service-learning collaborations.

Drawing on the Students as Scholars model (GMU 2015), we envision infusing our introductory courses -- which also serve general education -- with learning outcomes focusing on *discovery of scholarship* (separating personal beliefs and evidence, articulating how scholarship influences society, understanding a variety of perspectives on a specific body of knowledge, evaluating credibility of information, understanding research methods, understanding how knowledge is transmitted within and across disciplines and to the public). Our upper level courses (many of which are open to non-majors) will reinforce and build upon *scholarly discovery* and elaborate on *scholarly inquiry* (situating the scholarly inquiry within a broader context, articulating and refining questions, following ethical principles, choosing an appropriate set of quantitative or qualitative methods for scholarly inquiry, assessing the validity of assumptions and evidence), and in some cases involve the *creation of scholarship*. Our capstone experience, summer research opportunities, and special topics courses will revolve around the *creation of scholarship*, with intensive focus on independent research. In addition to scaffolding the broader research process, we also intend to engage students throughout the curriculum in the practice of scholarship through small, directed research activities such as lab modules, discovery-based research courses (NAS 2015) and field experiences (Hall et al 2005).

Our plan is to 1) submit a revised curriculum to the Programs Committee in September 2016, 2) revise courses during AY 2016-2017 and summer 2017, and 3) to implement the curriculum beginning Fall 2017. We plan to consult with several outside experts as we revise the curriculum and create our assessment tool. In addition, we plan to engage current and former students for feedback on our revisions. Please see timeline below for details.

Work Plan & Implementation Schedule

Time Line	**Task**
Spring 2016	Revise our systems approach statement
	Produce a final set of measurable and assessable program learning outcomes in these four areas: content, skills, experiences, and values.
	Use the NAGT program matrix tool to map how our *current* curriculum addresses these *new* learning outcomes.
Summer 2016	Use the program matrix tool mapping results to revise the EES curriculum. Consult with outside experts in natural and social sciences. Engage students for feedback on curriculum.
	Develop a new assessment tool for the EES curriculum. Consult with outside expert on assessment.
	Consult with current and former students for feedback on program revisions.
Fall 2016	Submit EES program revisions to Programs Committee
AY 2016-2017	Revise courses (We may apply for another LARC to support specific courses or modules related to research and scholarly activities)
Summer 2017	Revise courses
Fall 2017	Implement new EES curriculum

Form and Schedule for Assessment for Program Revision

As noted above part of our program revision includes developing a streamlined assessment tool and process.

4. A memo from the department chair(s), indicating departmental or program approval for proposed project

This LARC proposal reflects the effort of the 5 members of the Environmental & Earth Sciences department, Joe Bowersox, Mindy Butterworth, Katja Meyer, Scott Pike, and myself. It is based on three years of discussion and planning beginning in 2013 with our self-study, continuing with the hiring of two new faculty over the past two years, and culminating in our intensive work this academic year to prepare for the summer curriculum revision process. Our dual focus on utilizing a systems

approach to curriculum content and research-rich activities for practice reflects direction from our self-study and current best practices. My colleagues have demonstrated their commitment to developing a common vision for our curriculum, and will approach the hard work ahead with energy, enthusiasm, and an excellent work ethic.

On behalf of the EES department I approve the program revision and give it my full support.

Karen Arabas
Chair, EES

5. A proposed budget for supplies and expenses anticipated in completing the project, itemized

Item	**Cost**
HONORARIA • Willamette Faculty: 5 x $2000 • Current and Former Students: 3 x $250 • Outside Experts*: 3 x $500 1 geo/natural scientist 1 social scientist 1 assessment expert	$12,250
EXPENSES • Texts Thinking in Systems: A Primer: 5 x $12 • Meals working lunches, summer 2016: 4 x $75	$360
TOTAL	$12,610

* Outside experts we are considering:

<u>geo/natural sciences</u>
Dr. Dallas Rhodes, Humboldt State University
Dr. Kathleen Purvis-Roberts, Pitzer College
Dr. Barabar Tewskbury, Hamilton
Dr. David Mogk, Montana State University

<u>social sciences</u>
Dr. Phil Brick, Whitman College

<u>assessment</u>
Jana Bouwma-Gearhart, Oregon State University
Dr. Mary Savina, Carleton College

References cited

GMU (George Mason University). *2015 Students as Scholars: Course and Curriculum Mapping*. http://oscar.gmu.edu/fac-staff/Mapping.cfm. Accessed 1/18/16

Hall, S.J., T. Tietenberg, and S. Pfirman. 2005. *Environmental Programs at Liberal Arts College: Findings and Recommendations for the Andrew W. Mellon Foundation*. What Works – A PKAL Essay. Project Kaleidoscope. Washington DC.

NAS (National Academies of Sciences, Engineering, and Medicine). 2015. *Integrating Discovery-Based Research into the Undergraduate Curriculum. Report of a Convocation*. Washington, DC. National Academies Press.