Initiative Report for Science 2009-10

Sustainability Curricula: Life Science, Chemistry, Earth and Environmental Science

Summary:

The Biology, Chemistry, and Earth and Environmental Sciences (EES) disciplines request curriculum development and Perkins support to increase sustainability curricula by:

- developing new courses,
- adding specific lab activities to existing courses to meet the needs of the new Sustainability Coordinator AAS degree, and
- infusing existing courses with concepts and activities that will teach students concepts and practices in sustainability.

Description

The Biology, Chemistry and EES disciplines propose to develop and/or redesign a series of courses that will teach students concepts and practices in sustainability. The following courses are being proposed:

1. Developing a BI 103 course that can be offered as a field biology class to ecologically significant sites, both nationally and internationally. The emphasis will be on evolution, ecology, and the classification and characteristics of different organisms with a strong infusion of sustainability concepts and practices.
2. Chemistry: Environmental Chemistry course development
3. Earth and Environmental Science(EES)- Sustainability theme lab activities for ENVS courses
4. Earth and Environmental Science(EES)- infusing sustainability content in all EES Courses

The Biology course development will complement other field biology offerings in the existing curriculum. The Chemistry course will be a new general education offering and is expected to be included in the new Sustainability Coordinator AAS degree. The course may articulate with Environmental Science courses or Chemistry courses at UO or OSU.

The Earth and Environmental Sciences discipline plans curriculum development in the area of sustainability in two ways: (1) to incorporate practical material in ENVS (Environmental Science) courses and a Geology course in the discipline required or recommended for the new Sustainability Coordinator AAS degree and other sustainability-related AAS degrees; and,(2) to infuse sustainability in all of its courses.

Examples of topics and hands-on activities that will extend sustainability learning in ENVS include:

- ENVS 181 Soil Conservation Lab, Recycling lab, waste audit, cradle- to-cradle manufacturing, Xeriscaping
- ENVS 182 Air pollution monitoring lab, Indoor air pollution lab
- ENVS 183 Water conservation practices, Bioswale lab
- ENVS 184 Campus carbon footprint audit, Campus transportation planning

Faculty working on curriculum for these courses will consult with the Sustainability and Learning Committee and Sustainability Coordinator AAS degree advisory committee to learn what additional materials might be needed and incorporated into these courses. These courses are also restricted electives for the NRG and WATR programs; and may be included in focus areas for a proposed GIS AAS degree. We do not plan to change the basic content of the courses, but to cover topics with a greater emphasis on sustainability and with more practical applied activities.

In addition, EES faculty will infuse sustainability into all their courses. This will require time to take one of the infusion courses that will be given on campus and time to prepare new sustainability curriculum to introduce into the courses.

Questions and Answers

How is the initiative linked to the Unit Plans most recently submitted?

1. **How does it continue the achievement of those goals?**
2. **If this is a continuation of an initiative started last year, make sure that relationship is clear.**

How is this initiative linked to the efficiencies and productivities plans you had last year?

1. **How does it continue the achievement of these plans?**
2. **If this is a continuation of an efficiency or productivity plan started last year, make sure that relationship is clear.**

The Science 2008-09 Unit Plan called for increasing sustainability concepts in the science curricula, by providing new course offerings and highlighting existing courses which include sustainability topics. As part of that initiative the Science Sustainability work group designed a Science Sustainability Course of Study which includes many of the courses mentioned in the description above. By developing additional sustainability pieces for those courses, they will be even more suitable for the course of study. The course of study will be finalized after these courses have been approved using the new college-wide Sustainability Focus course form developed by the Sustainability and Learning Committee. This form was approved by the Curriculum Approval Committee in its January 14th meeting.

The previous Unit Plan proposed a new biology course with sustainability content. BI 103 - Biodiversity and Sustainability was developed using Curriculum Development funding. The course highlights basic concepts of sustainability in the context of biodiversity in a range of local ecological settings, including Lanes Native Landscaping, forests, and wetlands. The proposed new course will utilize many of those concepts and teach them in the context of ecosystems which are very different from the local environment, providing students with the opportunity for study in foreign countries. The proposed course will meet many of the sustainability focus criteria.

The Chemistry course will be included in the new Sustainability Coordinator AAS degree program, which is being developed by the Sustainability and Learning Committee. UO has a course called CH 113 Chemistry of sustainability, which was added last year; our new course is likely to articulate with that course and possibly some of the Environmental courses at four year schools.

The range of infused and new curricula proposed here will significantly expand the Division's ability to meet the learning needs of students interested in this vital topic. We expect these courses to draw students and enhance enrollments in general education courses.

Describe the resources needed:

1. Developing a new sustainability-themed field biology course: 100 hours, Curriculum Development
2. Developing a new Environmental Chemistry course: 100 hours, Curriculum Development
3. Developing laboratory and other hands-on activities for 4 courses in the Sustainability Coordinator AAS program and other CT programs: 100 hours spread over 4 courses, Curriculum Development/Perkins Funds plus $$$ in materials and supplies for new lab activities, Perkins Funds
4. Infusing sustainablity concepts into all 15 EES courses: 150 hours, Curriculum Development

In association with #3 above, we are requesting $3000 in M&S funding through the Perkins Fund to provide materials and supplies for field exercises, demonstrations, and student participatory laboratory activities to help students learn concrete and specific methods of sustainability related to natural science. For example:

- Air quality sampling and testing equipment (indoor air quality meters, gas sensing equipment, etc.)
- Water quality sampling and testing equipment (water turbidity meters, temperature gauges, colorimeter for chemical testing, dissolved oxygen meters, etc.)
- Soil sampling and testing equipment (soil augers, sieves, soil test kits, etc.)
- Demonstration equipment (groundwater flow simulation systems, Ocean current models, etc.)

- Data logging equipment

What specific measurable program outcomes do you expect to achieve with this initiative? The outcomes should be specific enough to be measurable. Also, outline the method that will be used to determine the results.

Student learning outcomes: More students will have access to learning about sustainability in the context of environmental and ecological principles; student learning about sustainability will increase.

The proposed new curricula and learning activities will:
(criteria from the Sustainability Course Status application)

- Provide opportunities for students to learn about practices that support and improve the health of the systems that sustain life.

- Provide an interdisciplinary perspective that builds understanding of sustainable ecological, social and economic systems and, concern for environmental justice, and the competence to act on such knowledge.

- Equip and encourage students to participate actively in building socially diverse, just, and sustainable society, while cultivating connections to local, regional, and global communities.

- Emphasize activities that incorporate critical thinking

- Incorporate interactive learning activities (e.g.: in-class writing exercises classroom discussion peer-review of written material web-based discussion groups, service learning).

Enrollment outcomes:
New Biology Course: Regional Field Ecology
Enrollment will be about 24/section, in a 4-credit lecture and lab course, for an estimated 3.11 in FTE per section, if full. The course may be offered up to twice/year. Depending upon funding for staffing, the course may enhance enrollment or may provide an alternate option from existing courses.

New Chemistry Course: Environmental Chemistry
Enrollment will be about 24/section, in a 4-credit lecture and lab course, for an estimated 3.11 in FTE per section, if full. The course may be offered up to twice/year. Depending upon funding for staffing, the course may enhance enrollment or may provide an alternate option from existing courses.

EES courses as part of the Sustainability Coordinator AAS degree program: These courses currently are at 100% capacity. When the new program begins, we may expect increased enrollments in these courses. Initially, one cohort of 24 students may enroll in

one or more of the courses. We could conceivably add three new sections, at 24/section, in a 4-credit lecture and lab course will equal 9.33 FTE.

The curriculum infusion activities will not necessarily lead to increases in FTE, but will promote sustainability values and education at the college; and may increase retention.

Department Priority:

4

Unit Resources:

Priority ranking for this initiative was determined by SAC members drawing numbers randomly. All the initiatives are valuable to the proposing disciplines and all have the support of the Division.

Regional Field Biology: Science biology faculty will teach the course. Laboratory activities will utilize existing equipment in the Life Science Stockroom. Field equipment kits will also be created by the Stockroom to distribute to the students at their distance sites. Life Science lab coordinator and staff will support the course.

Environmental Chemistry:
The course will use existing laboratory space, equipment and supplies; and be supported by the Life Science lab coordinator and the Physical Science lab coordinator.

Sustainability Infusion Project: This request will support faculty who are being trained this year to infuse sustainability concepts into their courses. Three of the faculty (part-time) who teach ENVS courses have already gone through the training and will be training others this year. This project covers the time faculty members spend in the training courses.

New laboratory activities in the ENVS courses will utilize existing materials and supplies in the Geology Stockroom, Life Science Stockroom, and the Physical Science Stockroom such as stream table, soil ecosystem faunal analysis apparatus, spectral analysis instruments, etc. They will also have support from the Life Science lab coordinator and the Physical Science lab coordinator.

Funding Request: Carl Perkins

Is this a Career & Technical Education program approved by the state and offered through Lane for credit?

No

If not a Career & Technical Education program, does your request provide considerable support for students enrolled in these programs?

Yes

Do you have an advisory committee that meets 2-3 times per year?

No

If request is for personnel, will funds be used to replace an existing position?

How will funding this initiative increase or sustain the academic achievement and technical skills attainment (GPA of 2.0 or better) of Career and Technical Education students?

ENVS 181, 182, 183, and 184 are used as restricted electives in several AAS degrees and will be required courses in the Sustainability Coordinator AAS degree.

1. NRG AAS degrees: ENVS 181, 182, 183, and 184
2. Water Conservation Technician degree: ENVS 183 and 184
3. Sustainability Coordinator AAS degree (under development): ENVS 181, 182, 183, and 184

Career Technical students in these programs will gain foundational knowledge about sustainability and the science of natural systems. Students will gain practical skills and critical thinking through completing laboratory activities using sustainability concepts. Two of these programs are well-underway; the third is close to being submitted. In addition, planning work is underway for a fourth CT program that would incorporate ENVS courses. GIS/Geography faculty are considering a GIS AAS degree that will include several focus tracks, one of which will be Environmental Science.

The Sustainability Coordinator AAS is job-driven, and is specifically designed to increase students' access to careers, helping them become prepared to enter the workforce. Students taking the ENVS courses get a solid background in sustainability issues, especially those having to do with the natural environment. The new activities, labs and demonstrations will be specifically designed with these students in mind to give them tools they could use in industry, government or at educational institutions to help them become more sustainable.

With the addition of the practical sustainability lab activities with a CTE focus, the four ENVS courses will meet the needs of CTE students as well as provide AAOT credit. This dual purpose has been noted as a desirable objective in course development by the Lane Board of Education and the Curriculum Committee.

How will funding this initiative increase or sustain the number of CTE students that graduate or receive a one year certificate from Lane and help prepare the students for employment?

This initiative will provide options for CTE students to complete their AAS degrees in sustainability-related fields; and also obtain AAOT credits, should they wish to pursue continued education beyond the AAS. With ties to potentially ***three AAS degree programs***, these transfer-credit courses will provide a strong link between CT training and continued education. Students enrolling initially in the transfer courses will be able to continue into an AAS degree; and students starting in the AAS track will have the opportunity to gain AAOT credits.

EQUIPMENT $

COMPUTER HARDWARE $

COMPUTER SOFTWARE $

MATERIALS & SUPPLIES $

3000

CURRICULUM DEVELOPMENT (Hours)

100

PART-TIME FACULTY $

TIMESHEET STAFF $

TRAVEL $

Can this initiative be partially funded?

Yes

EQUIPMENT $

(E) Explanation of effect of partial funding:

COMPUTER HARDWARE $

(CH) Explanation of effect of partial funding:

COMPUTER SOFTWARE $

(CS) Explanation of effect of partial funding:

MATERIALS & SUPPLIES $

1500

(MS) Explanation of effect of partial funding:

Partial funding of materials and supplies will allow us to purchase supplies for some but not all of the planned activities. For example with half funding level we could purchase water quality sampling and testing equipment and demonstration equipment but not the air and soil sampling or data logging equipment.

CURRICULUM DEVELOPMENT (HOURS)

80

(CD) Explanation of effect of partial funding:

This would reduce the number of hours from 25/course to 20/course. All faculty involved in this project are part-time faculty. The reduction in hours could limit their ability to meet and work collaboratively on this project which affects four courses altogether.

PART-TIME FACULTY $

(PF) Explanation of effect of partial funding:

TIMESHEET STAFF $

(TS) Explanation of effect of partial funding:

TRAVEL $

(T) Explanation of effect of partial funding:

Funding Request: Curriculum Development

1. List the following information

- **Course Numbers (titles if not currently offered)**
- **Instructor Name(s) who will work on the curriculum development**
- **Whether each of the courses is in, or has been through, the curriculum approval process**

BI103x, Regional Field Biology, Joe Russin and Bert Pooth; not developed or approved

Environmental Chemistry, CH 1xx, Gary Mort; not developed or approved

The additions and enhancements to the EES curricula will be accomplished by a team approach involving all of the part-time faculty currently teaching in the discipline; additional part time faculty may be involved. Lead faculty member is Claudia Owen. If awarded, funding will be distributed among the part-time faculty and overseen by our Admin. Assistant, Connie Rowlett.

All of the EES courses have been approved and are currently in the annual schedule for Science.

Adding sustainability labs to courses:
ENVS 181, ENVS 182, ENVS 183, ENVS 184

Infusion of sustainability concepts:
ENVS 181, 182, 183, 184;G101, 102, 103, G201, 202, 203; G146, G147, GS 106, GS 142, GS 147

2. List each course number (or title) and the materials to be created for each class

- **Instructional goals, objectives, syllabi and outlines**
- **Lab instruction packets**
- **Practice, quiz, presentation &/or demonstration materials**
- **Other (specify)**

BI103x, Regional Field Biology: Instructional goals, learning outcomes, syllabi, packets, travel arrangements, class presentations, laboratory activities, text selection, internet resources, Moodle support, quizzes and exams.

Environmental Chemistry, CH 1xx: Instructional goals, learning outcomes, syllabi, packets, class presentations, laboratory activities, text selection, internet resources, Moodle support, quizzes and exams.

ENVS 181-184: New labs/activities/projects with sustainability emphases for Sustainability AAS degree learning outcomes and other sustainability-related AAS degrees.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147: Sustainability infusion material goals, objectives, lectures, labs, demonstrations

3. List each course number (or title) and give your timeline for beginning and completing each course curriculum development.

BI103x, Regional Field Biology: Begin work over the Summer 09; prepare and forward Course Approval forms to committee by end of Winter term, 2010. Complete development by end of Spring 2010. First teaching, Summer 2010.

Environmental Chemistry, CH 1xx: Begin work over the Summer 09; prepare and forward Course Approval forms to committee by end of Winter term, 2010. Complete development by end of Winter 2010. First teaching, Spring 2010.

Lab activities with sustainability emphases for ENVS 181-184: Begin work, Summer 09. Incorporate new material as it becomes ready. Complete work, end of Spring 2010.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147:Begin work, Summer 09. Incorporate new material as it becomes ready. Complete work, end of Spring 2010.

4. What are up to 3 departmental instructional goals that are met through the development of curriculum in each class?

The goals for the Science Divisions plans for FY10 are

1. optimizing sustainable access for students and options for quality learning; and
2. optimizing the curricula and resources we already have (continuing from FY09).

This initiative meets these goals by increasing sustainability-related courses in support of sustainability in learning goals.

Outcome of all: More sustainability curricula, increased student FTE in sustainability topics.

5. List each course number (or title) and give the value of the development of curriculum in each course to other faculty members.

BI103x, Regional Field Biology: The course developers will increase their understanding of sustainability and be able to act as resources to other faculty. They plan to incorporate GIS modules into the course. Other faculty will benefit by using the GIS modules as models for their own and because the GIS data will be added to our general bank of data, available for other GIS activities. Also, by developing this course, other biology faculty can use it as a model for teaching ecology in other ecosystems. A field course to Costa Rica has been successfully taught in 2006 and 2008. It has given students an opportunity to experience field biology and scientific inquiry in a tropical setting. The course format can be utilized as a model for other field courses that can be offered both nationally and internationally.

Environmental Chemistry, CH 1xx: Chemistry faculty work collaboratively on new curricula, so all will be informed by and work with the new activities and materials. Once developed, several Chem faculty may be certified to teach the new course.

Lab activities with sustainability emphases for ENVS 181-184: Other faculty members can use the labs or activities when they teach the courses; and the labs will provide models for faculty in other disciplines.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147: Other faculty members can use the goals, objectives, lecture, lab, demonstration materials when they teach the courses; and the infusion concepts can be shared with all faculty.

6. List each course number (or title) and say how many students will be served by the development of curriculum in each class.

BI103x, Regional Field Biology: 24 students/section, offered at least once per year.

Environmental Chemistry, CH 1xx: 24 students/section, offered at least once per year.

Lab activities with sustainability emphases for ENVS 181-184:

- ENVS courses: 7 to 9 sections/year = 168 to 216

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147:

- ENVS courses: total 7 to 9 sections/year = 168 to 216
- G 101, 102, 103: total 12 to 17 sections/year = 288 to 408
- G 201, 202, 203: total 3 sections/year = 72
- G 146, G147, GS 106, GS 142, GS 147: total 9 sections/year (some DL large enrollments) = 296

Totals for infusion project per year:
33 to 40 sections
872 to 1040 students

7. List each course number (or title) and give the specific benefits to students that you expect from the development of curriculum in each class.

BI103x, Regional Field Biology: Students benefit from emphasis courses because they allow students to fulfill science requirements with courses that relate scientific concepts to areas the students are interested in. This improves learning in general, and this course will allow successful students to make more informed decisions about issues involving sustainable practices. It will also give students an exposure to states or countries outside of Lane County, which will enhance their appreciation of diverse ecological and cultural differences.

Environmental Chemistry, CH 1xx: Students will gain knowledge of sustainability concepts and practical applications of sustainability in a wide variety of problems and environmental issues. Students will see the relevance of chemistry to supporting sustainability goals in the world.

Lab activities with sustainability emphases for ENVS 181-184:
Students will learn practical applications of sustainable practices in a range of natural systems; and gain critical thinking and problem solving skills.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147: Students will learn about sustainability in the context of specific learning outcomes for each course.

8. List each course number (or title) and give the specific benefits for diversity that you expect from the development of curriculum in each class.

BI103x, Regional Field Biology: By teaching this course in different parts of the US and the world, we can expose students to a variety of cultures. Even though the focus is on biology, they will learn how different cultural practices and philosophies affect human impact on the ecosystems and resources of those areas. They will also learn how people in other places blend traditional and modern techniques to find sustainability solutions. This will foster a cultural sensitivity to the ecological issues and problems around the world.

Environmental Chemistry, CH 1xx: Global examples and cultural practices will be included.

Lab activities with sustainability emphases for ENVS 181-184: Global examples and cultural practices will be included.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147: Global examples and cultural practices will be included.

9. List each course number (or title) and give the specific benefits to sustainability that you expect from the development of curriculum in each class.

BI103x, Regional Field Biology: This course will meet criteria for the Sustainability Course of Study. This course will provide sustainability learning outcomes. A major component of this course is to emphasize current and potential sustainable practices in the states/countries being studied, including the unique ecological, social and economic concerns associated with them. This will allow students to understand how those practices might be utilized in their own lives and locations. It also improves the chances that the future voters and leaders we are teaching will make sustainable choices. Also, the college will be better able to sustain itself when students can take a course that both satisfies a science requirement and examines issues important to students today. Students will be more likely to pursue other courses such as a foreign language or international history/culture classes if they have been exposed to international learning sites. This will further sustain the college by increasing retention.

Environmental Chemistry, CH 1xx: This course will meet criteria for the Sustainability Course of Study. This course will provide sustainability learning outcomes.

Lab activities with sustainability emphases for ENVS 181-184: These courses will meet criteria for the Sustainability Course of Study; and will meet requirements and/or electives for three and possibly four AAS degree programs. This project will significantly increase sustainabilty learning outcomes.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147: The infusion materials will increase sustainability learning outcomes in a wide range of general education science courses.

10. List each course number (or title) and give the specific effects on distributed learning that you expect from the development of curriculum in each class.

BI103x, Regional Field Biology: With the development of a Moodle site, the first week of the class on campus could be migrated to an online format, which could include students from anywhere. However, the 3 weeks of the distance site activities, by their experiential nature, cannot be performed in a distributed learning format. Students could travel from anywhere after the first week and meet at the distance site, allowing the class to be offered worldwide.

Environmental Chemistry, CH 1xx: Some of the curricula will use internet and Moodle-supported activities.

Lab activities with sustainability emphases for ENVS 181-184: Some of the curricula will use internet and Moodle-supported activities.

Infusion materials for ENVS 181, 182, 183, 184; G101, 102, 103; G201, 202, 203; G146, G147, GS 106, GS 142, GS 147: Some of the curricula will use internet and Moodle-supported activities. GS 142 and GS 147 are distance learning classes. Infusing sustainability materials will enhance these DL offerings.

Hours requested for Curriculum Development funding:

Please enter the amount of one of the following:

- **100 hours maximum for new development.**
- **70 hours maximum for course revision**
- **50 hours for 3-4 credit conversion**
- **other (use if multiple courses addressed in one initiative**

Do not enter any characters other than numbers and a decimal.

How many hours are you requesting? If there are multiple courses addressed in the initiative, please list each course number (or title) and give the number of hours requested for each course.

Can this initiative be partially funded?

Yes

Partially funded curriculum development HOURS requested:

340

Explanation of effect of partial funding:

100 hours for the Biology course; 50 hours for Environmental Chemistry course; 100 hours for enhancing the Sustainability Coordinator AAS courses (4 courses x 20 hours@); and 110 hours (11 remaining EES courses x 10 hours@) where sustainability concepts will be infused.

Funding Request: Technology Fee