Evaluating Sustainability in the University of Colorado at Boulder (UCB) Curriculum

STARS Curriculum Inventory Process and Results

Summer 2010

In accordance with STARS Credit ER-6: Sustainability-Focused Courses and ER-7: Sustainability-Related Courses¹, an assessment of the sustainability course content at the University was conducted by the University of Colorado Environmental Center². These metrics, worth ten points each in STARS, grant pro rata credit based on the proportion of an institution's courses that are considered sustainability-focused or sustainability-related. All points are granted for ER-6 if ten percent of an institution's coursework is sustainability focused; for ER-7, maximum credit is received if thirty percent of courses are related to sustainability. The enclosed assessment covers a time period of one year-specifically, the Spring and Fall 2010 semesters.

Total Course Offerings

An accurate count of all for-credit courses offered at the University of Colorado during the Spring 2010 semester was obtained from the UCB Bureau of Planning, Budget, and Analysis (PBA). Due to the constraints of this credit, the small number of for-credit continuing-education courses must be subtracted from this figure. Thus, 2,659 net courses were offered

Methodology

Faculty Survey

Faculty members were surveyed (Appendix A) to determine whether they had taught sustainability-focused or sustainability-related courses over a three-year timeframe. The survey was developed by NG and LG and approved by Dr. James White (JW), the director of INSTAAR. Survey responses were not adequate for statistical extrapolation due to the non-random nature of the sample, but all responses received were compiled into the relevant listing. Due to the high familiarity that faculty members are presumed to have with courses they have recently taught, deference was given to all course classifications by faculty. Non-credit courses offered through continuing education are not eligible for the credit and were eliminated from the raw data captured by the survey on October 20th, 2010.

Courses reported by the faculty were searched for in the CU Boulder online course catalog and linked to where found. We make the assumption that all courses contained in this catalog, which may be updated with ease, have been offered within the year unless expressly stated. Within this document, "within the year" is defined to encompass the Spring and Fall 2010 semesters. In most cases, the course was easily found and linked to

¹ See http://stars.aashe.org/ for a full listing of the requirements of both credits.

² Sustainability policy interns Natasha Goss (NG) and Linda Giudice (LG) were chiefly responsible for the project.

in the main document. One reported course offered in the Spring 2010 semester lacked a listing in the catalog. In this case, a syllabus from the last semester in which it was offered is linked to instead of the course catalog page.

Several reported courses are under general-subject listings that vary by semester. When a specific course title was mentioned by the survey submitter,³ this title was used as a point of investigation to determine the last verifiable semester during which such a course was offered. If this course was not offered during within the year, it was retained in the list of faculty-reported courses and stricken from the official list of sustainability-related or -focused courses. If it met the time requirements, it was retained in all lists. In both situations, a note was made in the faculty-reported course table containing a link to the latest available online syllabus or other documentation.

In three cases, unnamed sustainability-related courses reported by a faculty member could not be located by a search of the course catalog or by an Internet search. The probability that such courses have been offered within the year is low, and data entry errors may have caused the entry of a course catalog number that does not exist. Therefore, all three were stricken from both records. The raw data, also provided here, was never altered in any form and retains all information provided by the faculty.

Course-Description Examination

Due to the low productivity of the survey response, the course catalog was examined manually⁴. When the approved Definition of Sustainability in the Curriculum and the survey definition thereof (itself based off of the official definition) clearly classified the course as either focused on or related to sustainability based on its short, publicly available catalog description, it was listed as such. In cases where significant doubt existed as to whether a course met the criteria for a sustainability-focused offering and was clearly at least sustainability-related, it was classed as related. If there was ambiguity regarding whether a course was sustainability-related, it was not included.

The initial faculty survey established a three-year baseline, but collection efforts using this baseline proved impracticable. However, results were still generally usable because many courses are offered on a yearly basis, and those that have been discontinued or are offered less often than biannually are almost always excluded from the catalog. In integrating results from the survey into the report, courses reported by instructors were identified in the 2010-2011 CU Course Catalog⁵. If courses could not be identified there or elsewhere, or if they were last offered before the Spring 2010 semester, they were excluded as described above. The final product was reviewed for duplicate or erroneous entries.

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³ Submitters were asked to provide the "course name and code." Most interpreted this request as asking for the four-digit course signifier and its four-character departmental listing prefix.

⁴ Lists sourced from the Leeds School of Business and the Renewable and Sustainable Energy Institute (RASEI) were initially used to obtain the titles of some courses. These courses were subsequently verified by a catalog search.

⁵ http://www.colorado.edu/catalog/current/

Results

These results provide a snapshot in time and may not be 100% complete. Likewise, some course classifications may be modified, and courses may be added or dropped entirely going forward. In the interim, however, 79 sustainability-focused courses and 162 sustainability-related courses have been identified. Since approximately 2,900 courses (as explained above, the final number is pending) are offered each semester at the University, this leaves significant room for growth while indicating that CUB has a strong base of sustainability coursework from which to build.

Further Action Items

ER-8: Sustainability Courses by Department

This credit allocates points based on the proportion of academic departments that offer at least one sustainability course. Courses cross-listed in two or more departments may count for all departments in which they are listed. Full points are granted if 90 percent or more of departments have such a course. The Bureau of Planning, Budget, and Analysis (PBA) provides an official list of departments with a degree program approved by the Colorado Department of Higher Education⁶. This is an authoritative, official list of academic departments at UCB. Courses from this survey are listed by department, and data may be easily analyzed to determine which departments have a sustainability course and which do not. In addition, departments that appear to lack a sustainability course based on this survey may be contacted individually to confirm their status.

ER-9: Sustainability Learning Outcomes

Specifically, each course must be checked to ascertain whether it is a requirement for any degree program as defined by the credit¹ and whether it has at least one explicitly stated learning outcome that involves sustainability. If a course meets these requirements, it counts toward the credit, which provides points based on the number of students graduating from programs that require at least one course with a sustainability learning outcome. Courses reported by the faculty are known to meet the requirement, as the survey explicitly requires that reported courses have such an outcome. The following data points are needed for ER Credit 9:

- The number of students graduating from the University of Colorado over a time period that may range from one to three years. Since course data will cover one year, adopting a one-year timeframe may prove most feasible.
- ❖ The number of students graduating with a degree from a program that requires at least one course with a sustainability learning outcome. This is a multifaceted requirement and may be obtained through the methodology listed below.
 - ➤ Sort sustainability-focused and sustainability-related courses taught at this University (obtained from this survey) by departmental listing. Request departments to provide, for each course listed or crosslisted in the department,
 - Whether or not a given course has a sustainability learning outcome, as determined by the most recent syllabus for the course

⁶ https://pba.colorado.edu/scripts/broker.exe?_program=misclib.gmapshow. sas&_service=default&concept=DeptList

- If the course has such an outcome, all degree programs which require the course.
- From this list, develop a list of degree programs with sustainability learning outcomes.
- ➤ Contact representatives of the degree programs directly to determine the number of graduates from the program in the year specified.

These items await further analysis.

ADDENDUM

Defining Sustainability in the Curriculum

The University of Colorado at Boulder has committed to expanding upon its path marking sustainability achievements at the administrative, operational, student action, and academic levels. Our approach to sustainability-enhanced curricula is based on the following fundamental premises:

- Universities are the cultivators and generators of knowledge, charged with educating the leaders and decision-makers of tomorrow. As such, they play a crucial role in the creation of sustainable societies.
- Education is an essential tool for achieving sustainability: public awareness and training are vital in moving students and, by extension, society toward sustainability.
- Sustainability should be integrated into university curricula where appropriate.
- Each university has its own unique context, resources, and needs that influence its response to sustainability's prominence in its curriculum.

Working from established definitions of sustainability, we have assessed how the multifarious dimensions of sustainability should be expressed through the course offerings of the University. A widely accepted definition of one aspect of sustainability was given by the World Commission on Environment and Development in 1987. The Commission defined sustainable development as "forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs."

The American Association for Sustainability in Higher Education (AASHE) also incorporates the economic, social and environmental elements of sustainability into its definition; the so-called "three-legged stool". The relationship between these three elements must be properly managed to ensure the long-term viability of our communities and, by extension, the planet.

Sustainability-focused courses explore a broad range of sustainability topics, or select one area to investigate in depth; they may also "approach an issue or topic using sustainability as a lens." On the other hand, sustainability-related courses include one or more elements from this list as a discrete element in the course. Courses do not have to meet all the criteria in order to be classified as either sustainability-related or sustainability-focused.

Using the definitions provided above as a guide, we offer the following criteria for assaying sustainable curricula.

Courses designated as sustainability-related or sustainability-focused may contain one or more of the following elements:

- Integration of basic and applied knowledge from multiple disciplines, including the natural and social sciences, to analyze human-environment interactions;
- Analysis of the tradeoffs or co-benefits involved in managing resources for the social, economic, and environmental welfare of current and future generations;
- Development of alternative strategies for the use of natural, human, and fiscal resources that are compatible with the constraints on these resources;
- Implementation of practical solutions to socioeconomic and environmental challenges, including those that relate to energy, technology, ecosystems, social transformations, food systems, policy, and governance.

Students that successfully complete sustainability-related or sustainability-focused courses develop the ability to:

- Use and integrate knowledge and skills drawn from several disciplines;
- Understand how sustainability applies to their major, chosen career path, and everyday life;
- Apply scientific expertise to create sustainable solutions, technology, and applications;
- Communicate sustainability's essential elements;
- Promote sustainable communities on and beyond the University's campus.

Due to the shifting nature of sustainability issues, those linked to sustainability should be prepared to adapt continually. Thus, a curriculum that integrates sustainability also demands periodic reassessment.

Acknowledgements

The STARS team benefitted greatly from the dedication of researchers Natasha Goss and Linda Giudice, the two CU students who tirelessly reviewed catalogs, web sites, and syllabi in order to compile this Inventory. While coordinating with Professor James White, and Environmental Center Director Dave Newport, these students' brought abundant good sense, training and insight to a difficult task. Many thanks to Natasha and Linda!

INVENTORY

Sustainability-Focused Courses

ANTH 4020/5020 Anthropology of Energy
ANTH 4224/5224 Archaeology of the Maya And Their Neighbors
ANTH 7000 Current Research Topics in Cultural Anthropology
ATOC 4800 Policy Implications of Climate Controversies
ATOC 5000 Critical Issues in Climate and the Environment
ATOC 7500-003: The Global Carbon Cycle
BADM 4010 Sustainable Resort Tourism
BADM/OPIM 6930 Assessing Sustainable Energy Technologies
BADM/OPIM 6930 Commercializing Sustainable Energy Technologies
BAKR 1500 Colorado: History, Ecology, and Environment
BAKR 1600 Creating A Sustainable Future.
BCOR 3010 Business Applications of Social Responsibility
CHEN 4838-001 Energy Fundamentals: Global and Future Perspectives
COMM 4600 Collaborative Decision Making
CVEN 4434/5434 Environmental Engineering Design
CVEN 4700/5700 Sustainability and the Built Environment
CVEN 5020 Building Energy Audits
CVEN 5514 Bioremediation
CVEN 4830/5830-002 Sustainable Building Design
EBIO 4180 Ecological Perspectives on Global Change
EBIO 4800 Ecosystem Management
ECEN 2060 Renewable Sources and Efficient Electrical Energy Systems
ECON 3535/4535 Natural Resource Economics
ECON 4555 Transportation Economics
CVEN 5393/ECON 6555 Water Resources Development and
<u>Management</u>
ENVD 4035 Solar and Sustainable Design
ENVS 3001 Sustainable Solutions Consulting
ENVS 3003 Race, Class, and Pollution Politics
ENVS 3020 Advanced Writing in Environmental Studies
ENVS 3040 Conservation Biology
ENVS 3621 Energy Policy and Society
ENVS 4100 Topics in Environmental Policy
ENVS 5100 Energy Policy Research Seminar
ENVS 5810 Water Resources and Environmental Sustainability
ENVS 5820 Renewable Energy Policy
ENVS 5830 Critical Issues in Climate and the Environment
ENVS/EBIO 3040 Conservation Biology
ENVS/PHYS 3070 Energy and the Environment
ENVS/SOCY 4027 Inequality, Democracy, and the Environment
ENVS/SOCY 6007 Foundations of Environmental Sociology
FARR 2820 Future of the Spaceship Earth
GEOG 4371 Forest Geography Principles & Dynamics
GEOG 4430 Seminar: Conservation Trends
GEOG 4812 Environment and Development in South America
GEOG 5762 Sustainable Development: Theory and Classic Issues
GEOG 5772 Sustainable Development: Institutions and Policy

GEOG 5782 Sustainable Development: Critique

HONR 4000 Sustainable Energy

HUEN 2210- Engineering, Science, and Society

INVS 3402 Implementing Social and Environmental Change

JOUR 4822/5822 Reporting on the Environment

LAWS 6002 Public Land Law

LAWS 6302 Water Law

LAWS 6502 Wildlife and the Law

LAWS 6510 International Environmental Law

LAWS 6712 Climate Change Law and Policy

LAWS 7132 Energy Insecurity and Sustainable Energy

LAWS 7202 Environmental Law

LAWS 7209 Natural Resources Litigation Clinic

LAWS 7515 Poverty Law

LAWS/ENVS 6112 Foundations of Natural Resources Law and Policy

MATH 2380 Mathematics for the Environment

MBAX 6130 Sustainable Business Ventures

MBAX 6825 Sustainable Business

MCEN 4141 Indoor Air Pollution

MCEN 4228-005 Wind Energy

MCEN 4228/5228 Energy Conversion and Storage

MGMT 4080 Sustainable Operations

OPIM 4075 Sustainable Operations

PHIL 2140 Environmental Justice

PHIL 5240 Seminar in Environmental Philosophy

PHIL/ENVS 3140 Environmental Ethics

PSCI 3064 Environmental Political Theory

PSCI 3206 The Environment and Public Policy.

SEWL 2000 America, the Environment, and the Global Economy

SOCY 2077 Environment and Society

SOCY 4007 Global Human Ecology

SOCY 6017 Inequality, Democracy, and the Environment

WRTG 1150 First-Year Writing and Rhetoric

WRTG 3020 Topics in Writing

Sustainability-related Courses

ANTH 1100 Exploring a Non-Western Culture: The Tamils ANTH 1105 Exploring a Non-Western Culture: Tibet ANTH 1110 Exploring a Non-Western Culture: Japan ANTH 1115 The Caribbean in Post-Colonial Perspective ANTH 1120 Exploring a Non-Western Culture: Hopi and Navajo ANTH 1140 Exploring a Non-Western Culture: The Maya ANTH 1145 Exploring a Non-Western Culture: The Aztecs ANTH 1150 Exploring a Non-Western Culture: Regional Cultures of Africa ANTH 1160 The Ancient Egyptian Civilization ANTH 1170 Exploring Culture and Gender through Film ANTH 2010 Introduction to Physical Anthropology 1 **ANTH 3000 Primate Behavior** ANTH 4060 Nutrition and Anthropology ANTH 4170 Primate Evolutionary Biology ANTH 4505 Globalization and Transnational Culture ANTH 5600 Human Ecology: Cultural Aspects AREN 3130 Building Energy Laboratory **ASEN 4012 Aerospace Materials** ASEN 4018/4028 Senior Projects 1: Design Synthesis ASEN 4519/5519 Energy Systems for Earth and Aerospace Applications ATOC 1060 Our Changing Environment: El Niño, Ozone, and Climate ATOC 3070 Introduction to Oceanography ATOC 3300/GEOG 3301 Analysis of Climate and Weather Observations ATOC 3500 Air Chemistry and Pollution ATOC 3600/GEOG 3601/ENVS 3600 Principles of Climate ATOC 4750/5750 Desert Meteorology and Climate ATOC 5235 Introduction to Atmospheric Radiative Transfer and Remote Sensing ATOC 6100 Predicting Weather and Climate BCOR 2400 Fundamentals of Marketing CAMW 4001 Seminar on the American West CHEM 1011 Environmental Chemistry 1 CHEM 1031 Environmental Chemistry 2 CHEM 5061 Advanced Inorganic Chemistry 2 CHEM 5151 Atmospheric Chemistry CHEM 5161 Analytical Spectroscopy CHEM 5171 Electroanalytical Chemistry CHEM 6111 Nanoscience in Chemical Analysis and Biotechnology CHEN 1000 Creative Technology CVEN 1317 Introduction to Civil and Environmental Engineering CVEN 3414 Fundamentals of Environmental Engineering **CVEN 3424 Water and Wastewater Treatment** CVEN 4434/5434 Environmental Engineering Design CVEN 4474 Hazardous and Industrial Waste Management CVEN 5050 Advanced Solar Design CVEN 5323 Applied Stream Ecology CVEN 5494 Surface Water Quality Modeling CVEN 5830-005 Building Energy Systems

CVEN/ENVS 3434 Introduction to Applied Ecology

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EBIO 1030 Biology: A Human Approach 1
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EBIO 1040 Biology: A Human Approach 2

EBIO 1210 General Biology 1

EBIO 1220 General Biology 2

EBIO 2040 Principles of Ecology

EBIO 3170 Arctic and Alpine Ecology

EBIO 3175. Arctic and Alpine Ecology Lab

EBIO 3180 Global Ecology

EBIO 3190 Tropical Marine Ecology

EBIO 4060 Landscape Ecology

EBIO 4100/5100. Advanced Ecology

EBIO 4175 The Scientific Basis for Ecosystem Management of Public Lands

EBIO 4630 Field Techniques in Environmental Science

EBIO 4800/5800 Microbial Ecology; Culture, Politics and Climate Change

EBIO/GEOL/ENVS 4160 Introduction to Biogeochemistry

ECEN 4517/5517 Renewable & Power Electronics Lab

ECEN 4555/5555 Principles of Energy Systems & Devices

ECEN 5005 Photovoltaic Devices

ECEN 5017 Conventional and Renewable Energy Issues

ECEN 5254 Radar and Remote Sensing

ECON 3545/4545 Environmental Economics

ECON 4514 Economic History of Europe

ECON 8535 Environmental Economics I

ECON 8545 Environmental Economics II

ECON 8555 Water Resources Development and Management

EDUC 5316 Nature of Social Studies and Social Studies Education

EDUC 5355 Methods and Materials in Secondary Social Studies

ENGL 3267 Women Writers

ENVD 2001 Introduction to Social Factors in Environmental Design

ENVD 2003 Ecology and Design

ENVD 2100 Architecture Studio 1

ENVD 2120 Environmental Design Lab: Sustainable Design

ENVD 2130 Environmental Design Lab: Conservation Design

ENVD 4023 Environmental Impact Assessment

ENVD 4311 Housing Policies and Practices

ENVD 4363 Design For/With Schools

ENVS 1000 Introduction to Environmental Studies

ENVS 3520 Environmental Issues in Geosciences

ENVS 3600 Principles of Climate

ENVS 5000 Policy, Science, and the Environment

ENVS 5100 Energy Science and Technology

ENVS 5120 Topics in Quantitative Methods

ENVS 5730 Introduction to the Policy Sciences: The Decision Process

ESBM 3700 Entrepreneurial Environments

ETHN 1123 Exploring Non-Western Cultures: Hopi and Navajo

EVEN 1000 Introduction to Environmental Engineering

FARR 1562 Gandhi's Satyagraha: Love in Action for Humans and Other Creatures

GEEN 1100 Social Impact of Technology

GEEN 1400 Engineering Projects

GEOG 1001 Environmental Systems 1: Climate and Vegetation

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GEOG 2002 Geographies of Global Change
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GEOG 2412 Environment and Culture

GEOG 3412 Conservation Practice and Resource Management

GEOG 3422 Conservation Thought

GEOG 3612 Geography of American Cities

GEOG 4261 Glaciers and Permafrost

GEOG 4271/5271 The Arctic Climate System

GEOG 4501/5501 Water Resources and Water Management of Western United States

GEOG 4822 Environment and Development in China

GEOG 6402 Seminar: Comparative Environmental Studies

GEOL 1010 Introduction to Geology

GEOL 1060 Global Change: An Earth Science Perspective

GEOL 2100 Environmental Geology

GEOL 3130 Global Warming: Understanding the Forecast

GEOL 3410 Paleobiology

GEOL 3500 Earth Resources and the Environment

GEOL 3520 Environmental Issues in Geosciences

GEOL 4060/5060 Oceanography

GEOL 4070 Paleoclimatology

GEOL 4080 Societal Problems and Earth Sciences

GEOL 4500 Critical Thinking in the Earth Sciences

GEOL/ENVS 3520 Environmental Issues in Geosciences

HIST 1010 Western Civilization 1

HIST 1061 The Rise and Fall of Ancient Rome

HIST 2543 Medieval Societies

HIST 4417 Environmental History of North America

HIST 6417 Readings in Environmental History

HONR 4055 Discourse Analysis and Cultural Criticism

HUMN 4835 Literature and Social Violence

INVS 1000 Responding to Social and Environmental Problems through Service Learning

INVS 3000 Innovative Approaches to Contemporary Issues through Service Learning

INVS 4402 Nonviolent Social Movements

INVS 4999 Teaching Social Justice

IPHY 3420 Nutrition, Health, and Performance

LAWS 6205 Lawyers for Social Change

LAWS 6503 Law and Social Sciences

LAWS 7122 Mining and Energy Law

LAWS 7164 Land Conservation Law

LAWS 7212 Environmental Litigation

LAWS 7916/7926 Independent Legal Research: Journal of International Environmental

Law and Policy

LAWS 8104 Seminar: Cities, Suburbs, and the Law

LAWS 8351 Seminar: Law and Economics of Utility Regulation

LAWS 8407 Seminar: Tax Policy

LDSP 2400 Understanding Privilege and Oppression in Contemporary Society-Leadership

in a Multicultural World

MBAC 6000 Socially Responsible Enterprise

MBAX 6801 Global Perspectives Seminar

OPIM 3000 Systems Thinking

PACS 4500 Senior Seminar in Peace and Conflict Studies

PHYS 1110 General Physics 1

PHYS 2010 General Physics 2

PRLC 2810 Global Issues in Leadership

PRLC 3810 Global Issues in Leadership

PSCI 4012 Global Development

SOCY 2011 Contemporary Social Issues and Human Values

SOCY 2031 Social Problems

SOCY 4017 Animals and Society

SOCY 4047 Topics in Environment and Society

SOCY 4052 Social Inequalities in Health

SOCY 7002 Social Disparities in Health

SOCY 7017 Population and Environment

WMST 2600 Gender, Race, and Class in a Global Contex

WMST 3500 Global Gender Issues

WMST 3730 Third World Women and the Politics of International Development

WRTG/NRLN 3020 Topics in Writing

XBUS 6640 Operations Management