



School of Environment and Natural Resources

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To: The Office of Academic Affairs

From: Ron Hendrick, Professor and Director

Date: June 30, 2011

Re: School of Environment and Natural Resources Semester Program Proposals

The faculty and staff of the School of Environment and Natural Resources (SENR) have completed a thorough review and revision of our undergraduate and graduate curricula in preparation for the conversion to semesters, and the SENR faculty has voted to recommend that the Office of Academic Affairs approve the attached semester curriculum proposals. In addition to the work of several curricular sub-committees within the School, the SENR Academic Affairs Committee reviewed and approved all semester conversion plans for undergraduate programs, and the SENR Graduate Studies Committee reviewed and approved plans for the MS, PhD, and MENR graduate programs. SENR faculty approved these semester plans by unanimous vote (25 in favor, 0 opposed, 0 abstentions) on April 16, 2010; subsequent minor revisions and updates to the plans have been approved by SENR curriculum committees as appropriate.

The following outline details the SENR programs proposed for semester: A) conversion, B) new approval, C) termination, and D) conversion with minimal changes but subsequent termination.

A. Existing SENR programs to be converted to semesters include:

(Note: Rural Sociology programs included below became part of SENR in 2010; program degree codes are in parentheses following program titles; specialization three-letter codes are in parentheses following specializations.)

Four Undergraduate Majors:

- 1) Environmental Science (ENVSCI-BS): *modified from four to five specializations representing existing focal areas in the major, including Ecosystem Restoration (ECR), Water Science (WTR), Environmental Molecular Science (EMS), Soil Resources and Environmental Sustainability (SOI), and Environmental Science Education (ESE).*
- 2) Forestry, Fisheries, and Wildlife (FFW-BS): *converted as semester equivalent, with appropriate revisions to maintain certification and double-certification options uniquely available (compared with other programs nationally) to students in this major, including Society of American Foresters (SAF) accreditation and The Wildlife Society (TWS) and American Fisheries Society (AFS) certifications. Three-letter specialization codes for FFW specializations (FAS, FOR, FWM, UFW, WFS, WPV, WLS) are detailed in the comment field of the FFW-BS program request.*
- 3) Environmental Policy and Decision Making (ENVPDM-BS): *modified in title (previously Environmental Policy and Management (EPM)) and designating three specializations based on existing focal areas in the major: Climate Change (CCP), International Issues (IIP), and Water Conservation (WCP).*
- 4) Natural Resource Management (NATRESM-BS): *modified in title (previously Parks, Recreation & Tourism (PRT)) and designating three specializations based on existing and emerging focal areas (made possible by the addition of Rural Sociology faculty to SENR in 2010) in the major: Parks and Recreation Management (PRM), Natural Resource Administration and Management (NRA), and Sustainable Agriculture (SAG), with additional focus-area options (non-transcript) aligned with employment opportunities and existing programs in the School: Forestry, Fisheries, Wildlife, Soil and Water, Visitor Services, and Zoo Science and Management.*

Two Undergraduate Minors:

- 1) Soil Resources (SOILSCI-MN): *converted as semester equivalent.*
- 2) Rural Sociology (RURLSOC-MN): *converted as semester equivalent.*

Two Graduate Degree Programs:

- 1) Master of Science (ENVNATR-MS): converted as **semester equivalent**
- 2) Doctor of Philosophy (ENVNATR-PH): converted as **semester equivalent**

The Environment and Natural Resources Graduate Program awards both MS and PhD degrees in seven areas of specialty (all converted as **semester equivalents**):

- Ecological Restoration (ERS)
- Ecosystem Science (ECS)
- Environmental Social Sciences (ESS)
- Rural Sociology (RS)
- Fisheries and Wildlife Science (FWS)
- Forest Science (FS)
- Soil Science (SSC)

Three Graduate Minors (all converted as semester equivalents):

- 1) Environment and Natural Resources (ENVNATR-GM)
- 2) Soil Science (SOILSCI-GM)
- 3) Rural Sociology (RURLSOC-GM)

One Professional Degree Program (converted as semester equivalent):

- 1) Master of Environment and Natural Resources (ENVNAT-MEN)

Three Combined Programs (all combined programs will be converted as **semester equivalents**, and impose no additional requirements or provisions beyond the requirements of the combined degrees. As such, and abiding all college and university rules of the degree-granting partners, forms for **these combined degrees are not included in these SENR semester electronic program proposals**):

- 1) Combined BS/MS
- 2) Combined BS/MENR
- 3) Dual Degree Program with the John Glenn School of Public Affairs: MS/ or MENR/MAPPM (Master of Arts in Public Policy and Management) or MS/ or MENR/MPA (Master of Public Administration)

B. New SENR semester programs proposed for approval by OAA:

Four undergraduate minors have been developed for semesters. Three minors correspond with existing majors in the School; three of these minors collectively replace the Natural Resources Management minor (listed as terminated, below). The fourth minor, Sustainable Agriculture, has been developed through the collaboration of Rural Sociology and Soils faculty, together with colleagues from across the College of Food, Agricultural and Environmental Sciences.

Undergraduate Minors:

- 1) Environmental Science (ENVSCI-MN)
- 2) Forestry, Fisheries & Wildlife (FFW-MN)
- 3) Society and Environmental Issues (SOCENV-MN)
- 4) Sustainable Agriculture (SUSTAGR-MN)

C. SENR programs to be terminated:

Each listed below is an old program name that has been replaced by current programs listed above, either through revised titles (1-3), being subsumed as a specialization into the ENR MS and PhD (4-7), or being replaced by more targeted options (8).

- 1) Fisheries and Wildlife Management (FWMGT-BS): no students remain under this old title
- 2) Forestry and Urban Forestry (FORUF-BS): no students remain under this old title
- 3) Human Dimensions in Natural Resources (HDNR-BS): no students remain under this old title
- 4) Natural Resources (NATRES-PH): no students remain under this old title
- 5) Natural Resources (NATRES-MS): no students remain under this old title
- 6) Soil Science (SOILSCI-PH): all students remaining under this old title will graduate by 2012
- 7) Soil Science (SOILSCI-MS): all students remaining under this old title will graduate by 2012

8) Natural Resources Management Minor (NATRESM-MN): this minor is being terminated because of its broad scope and is being replaced by the more specific new minors listed above that correspond to existing majors; no new students will be admitted after Spring 2012, and this minor should be terminated upon moving current students to appropriate (more targeted) new minors, which should be completed by Summer 2012.

D. SENR programs to be converted with minimal changes, but to be terminated thereafter:

No new students will be admitted to these programs effective immediately; the programs should be terminated upon the completion of the last student in the program, which should be no later than Spring 2015.

- 1) Rural Sociology (RURLSOC-MS)
- 2) Rural Sociology (RURLSOC-PH)

SENR faculty and staff have worked tirelessly to develop these plans, engaging in a thorough and collegial process. Two faculty retreats devoted significant time to semester conversion plans, and all faculty meetings beginning in the fall of 2009 included updates and discussion about semester conversion planning. Dr. Greg Hitzhusen was appointed by the School as a point person to facilitate Q2S planning, participated in regular UCAT Q2S workshops with colleagues from across the university, and established a Carmen site to share and organize Q2S working documents and resources. In addition to the committees mentioned above, several new committees led the curriculum development process, including four faculty working groups formed within each of the majors, and a core curriculum committee of a dozen faculty representing all of the specializations across the four undergraduate majors and including myself and the chairs of the Grad Studies Committee and Academic Affairs Committee. These groups reviewed all recent SENR curriculum revisions, researched semester programs of peer institutions, and generated creative proposals of how to improve and better integrate our multi-disciplinary curriculum. Curriculum mapping revealed gaps and overlap in our curriculum; to match our semester courses to our learning goals, at least nine new courses have been proposed, several others have been merged, and at least 75 courses will be discontinued. As a previous director of a Natural Resources program that underwent semester conversion at the University of Georgia, I provided guidance to revise SENR's curricular offerings around our core strengths, guided by learning outcome goals and encouraging options beyond existing structures and traditions. Several SENR faculty and staff participated in the College of Food, Agricultural, and Environmental Sciences bi-weekly Q2S Implementation Committee meetings starting in November 2009, sharing planning ideas with Q2S point people from across the College.

We also based our semester curriculum development on several faculty-led research efforts. Our social science faculty created a survey of environmental curriculum interests and career goals for CFAES, SENR and OSU undergraduate student samples, and results from over 1300 respondents (published results now *in press*) informed our vision of student interests, needs, and knowledge about the environmental topics addressed in SENR programs. We also completed phone interviews with SENR alumni and stakeholders to examine curricular elements most valuable to graduates and employers. And I conducted exit interviews of SENR students to better understand their experience in SENR programs. These measures and the efforts mentioned above collectively led the faculty to propose an expanded core of courses to help SENR students better integrate natural and social science elements of the curriculum, and to modify the majors as described above. The core curriculum committee will remain intact to monitor the quality and success of the semester curriculum, and make revisions as appropriate into the future.

This proposed curriculum represents welcome changes that increase the efficiency and complementarity of SENR programs, maximizing the expertise of our faculty and improving opportunities for SENR students to prepare for graduate education and succeed in their professional careers. I have also attached a commentary detailing SENR's preliminary assessment plans for semester programs. These program proposals reflect the outstanding collaborative efforts of SENR faculty to prepare for the semester transition. I heartily recommend approval of these plans, and appreciate OAA's ongoing efforts to strengthen our curriculum in OSU's transition to semesters.



Ronald L. Hendrick, Ph.D.
Director, SENR

Status: PENDING

PROGRAM REQUEST
Environmental ScienceLast Updated: Pfister, Jill Ann
01/14/2011

Fiscal Unit/Academic Org	Sch of Enviro&Natural Res - D1173
Administering College/Academic Group	Food, Agric & Environ Science
Co-administering College/Academic Group	
Semester Conversion Designation	Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., degree/major name changes, changes in program goals, changes in core requirements, structural changes to tracks/options/courses)
Current Program/Plan Name	Environmental Science
Proposed Program/Plan Name	Environmental Science
Program/Plan Code Abbreviation	ENVIRSC-BS
Current Degree Title	Bachelor of Science Environment&Natural Resources

Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		181	120.7	121	0.3
Required credit hours offered by the unit	Minimum	43	28.7	34	5.3
	Maximum	93	62.0	66	4.0
Required credit hours offered outside of the unit	Minimum	88	58.7	55	3.7
	Maximum	138	92.0	87	5.0
Required prerequisite credit hours not included above	Minimum				
	Maximum	0	0.0	0	0.0

Explain any change in credit hours if the difference is more than 4 semester credit hours between the values listed in columns B and C for any row in the above table

There is a slight expansion of hours required in SENR because the SENR core is expanding, and ES majors will be required to take an additional social science course within SENR to better integrate the social and natural science dimensions relevant to environmental science.

Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

Program Learning Goals

- Strong foundation of knowledge in mathematics and science
- Ability to communicate effectively (oral and written)
- An understanding of Natural Resource policy
- Scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world
- Knowledge and skills to understand and solve environmental science issues
- Knowledge of contemporary environmental science issues
- Competitive preparation for professional career-track employment in Soil Science, Water Resources, Ecosystem, or related field

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Status: PENDING

PROGRAM REQUEST
Environmental ScienceLast Updated: Pfister, Jill Ann
01/14/2011**Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes****Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? No****DIRECT MEASURES (means of assessment that measure performance directly, are authentic and minimize mitigating or intervening factors)****Classroom assignments**

- Other classroom assessment methods (e.g., writing assignments, oral presentations, oral exams)

Evaluation of a body of work produced by the student

- Capstone course reports, papers, or presentations

INDIRECT MEASURES (means of assessment that are related to direct measures but are steps removed from those measures)**Surveys and Interviews**

- Student survey
- Alumni survey
- Student evaluation of instruction
- Student interviews or focus groups

USE OF DATA (how the program uses or will use the evaluation data to make evidence-based improvements to the program periodically)

- Meet with students directly to discuss their performance
- Analyze and discuss trends with the unit's faculty
- Analyze and report to college/school
- Make improvements in curricular requirements (e.g., add, subtract courses)
- Make improvements in course content
- Periodically confirm that current curriculum and courses are facilitating student attainment of program goals

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

Program Specialization/Sub-Plan Name	Ecosystem Restoration (New)
Program Specialization/Sub-Plan Goals	• see attachment
Program Specialization/Sub-Plan Name	Water Science (Existing)
Program Specialization/Sub-Plan Goals	• see attachment
Program Specialization/Sub-Plan Name	Soil Res & Env Sustainability (Existing)
Program Specialization/Sub-Plan Goals	• see attachment
Program Specialization/Sub-Plan Name	Env Science Education (New)
Program Specialization/Sub-Plan Goals	• see attachment
Program Specialization/Sub-Plan Name	Env Molecular Science (New)
Program Specialization/Sub-Plan Goals	• see attachment

Pre-Major**Does this Program have a Pre-Major? No**

Attachments

- ESqtrAdvising.pdf: Environmental Science Quarter Advising Sheets
(Quarter Advising Sheet(s). Owner: Hitzhusen, Gregory Ernest)
- ESrationale.doc: ES program rationale
(Program Rationale Statement. Owner: Hitzhusen, Gregory Ernest)
- ES_specializations_subplan_goals.doc: ES specialization/sub-plan goals
(Other Supporting Documentation. Owner: Hitzhusen, Gregory Ernest)
- SENR_Assessment.doc: SENR prelim. assessment plan
(Other Supporting Documentation. Owner: Hitzhusen, Gregory Ernest)
- SENR_Q2S_Transition_Plans.pdf: SENR Transition Plans
(Transition Policy. Owner: Hitzhusen, Gregory Ernest)
- SENRcoverLetterFinal.pdf: SENR cover letter
(Letter from Program-offering Unit. Owner: Hitzhusen, Gregory Ernest)
- ESemap_Nov22.xlsx: ES curriculum map
(Curricular Map(s). Owner: Hitzhusen, Gregory Ernest)
- ES_Sem_AdvFinal.xlsx: ES semester advising sheets
(Semester Advising Sheet(s). Owner: Hitzhusen, Gregory Ernest)
- ES_Major_Q2S_draft_2.4.docx: ES semester advising overview
(Semester Advising Sheet(s). Owner: Hitzhusen, Gregory Ernest)

Comments

- note: degree code should be revised to: "ENVSCI-BS"
Semester advising sheets include course lists specific to major, while attached course list spreadsheet includes all SENR courses; "overview" semester advising sheet provides general template to plan for each major, in a format more like what will be made available to students. *(by Hitzhusen, Gregory Ernest on 12/07/2010 03:28 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Hitzhusen, Gregory Ernest	11/26/2010 11:23 PM	Submitted for Approval
Revision Requested	Pfister, Jill Ann	12/06/2010 03:51 PM	Unit Approval
Submitted	Hitzhusen, Gregory Ernest	12/10/2010 03:10 PM	Submitted for Approval
Approved	Hitzhusen, Gregory Ernest	12/10/2010 03:10 PM	Unit Approval
Revision Requested	Pfister, Jill Ann	12/14/2010 11:57 AM	SubCollege Approval
Submitted	Hitzhusen, Gregory Ernest	12/14/2010 12:55 PM	Submitted for Approval
Approved	Hitzhusen, Gregory Ernest	12/14/2010 01:00 PM	Unit Approval
Revision Requested	Pfister, Jill Ann	01/13/2011 11:56 AM	SubCollege Approval
Submitted	Hitzhusen, Gregory Ernest	01/13/2011 02:01 PM	Submitted for Approval
Approved	Hitzhusen, Gregory Ernest	01/13/2011 02:01 PM	Unit Approval
Approved	Pfister, Jill Ann	01/14/2011 05:18 PM	SubCollege Approval
Approved	Pfister, Jill Ann	01/14/2011 05:19 PM	College Approval
Pending Approval	Soave, Melissa A	01/14/2011 05:19 PM	CAA Approval

Environmental Science (ENVSCI-BS) Program Rationale

Students currently following the ES major in the School of Environment and Natural Resources (SENR) choose from among four specializations, all of which lead to a Bachelor of Science. The four specializations are the “Land Option,” the “Soil Science Option,” the “Waste Management Option,” and the “Water Option.” Over the last two years, SENR faculty involved in teaching courses in the ES major undertook an extensive review of the curriculum and the classes being taught. We are proposing a revised ES major with the following five specializations: “Ecosystem Restoration Specialization,” “Environmental Molecular Sciences Specialization,” “Environmental Science Education Specialization,” “Soil Resources and Environmental Sustainability Specialization,” and “Water Science Specialization.”

This revised curriculum is based on the findings of our extension review and feedback from faculty, students and stakeholders. These findings can be summarized as follows:

- a. Environmental science is a quickly evolving field that requires both a solid foundation in biology, chemistry and physics, but also a strong understanding of social issues and various environmental issues. The proposed major is conserving the solid natural science and social science foundation already existing in our current curriculum, but is embracing new environmental issues facing the world.
- b. SENR has hired a number of new faculty over the past decade, providing opportunities to teach in the novel areas of environmental science mentioned above. These new areas are becoming increasingly attractive to students and stakeholders.
- c. The names of our options needed to be updated, to reflect the recent advances in the field of environmental science and to better communicate the content of the courses and the major. Some of the critical areas of environmental science – such as topics related to soil and water issues – are maintained in this curriculum, but the titles and the content of the majors have been updated.
- d. Students in environmental science follow a variety of career paths. Some students pursue graduate programs in fields related to natural or social science, others are interested in entering a career in teaching, and others enter the professional life in one of the very diverse field of environmental science. We have increased the diversity of options that students will be able to take to provide greater choice and flexibility.

In summary, the revised major is proposed to (1) enhance disciplinary depth and serve the professional endeavors of stakeholders at the state, regional and national levels of operation; (2) better prepare students for careers in the environmental science disciplines; (3) better serve students who wish to be informed citizens on natural resource and environmental issues; and (4) increase accessibility of the major to a broader array of students.

Environmental Science (ENVSCI-BS) Program Specialization/Sub-Plan Goals

- **Ecosystem Restoration** – this option is intended to attract students who have interest in understanding how ecosystem (both aquatic and terrestrial) function in order to preserve, created and restore them. The curriculum provides students with a good understanding on how ecosystems function at the physical, biological, chemical and integrated levels. The curriculum requires students to take classes in restoration ecology, ecosystem science, ecological engineering, fate of pollutant, and to further specialized with classes of their choice. The curriculum will prepare students to engage in restoration projects ranging from the remediation of polluted ecosystem to the created of newly ecosystems.
- **Environmental Molecular Science** – this option is intended to attract students who have an interest in both biological and physical sciences, and a desire to provide solutions to the world’s environmental challenges. The curriculum provides students with a multidisciplinary education in biochemistry, environmental science, geochemistry, microbiology, and molecular biology so that they may pursue careers in environmental molecular science or continue their studies in a M.S. or Ph.D. program in biology, environmental science, geology, or natural resources. The option requires that students take an equal number of credit hours in four core areas, which include biology, environmental science, geology, and molecular biology. For the biology and molecular biology courses, a student has the option to choose between classes on microbiology and/or plant science while the geological courses can be tailored for those interested in geochemistry and/or mineralogy. The courses in environmental science provide students with a solid background in soil and water chemistry, and issues related to environmental stewardship.
- **Environmental Science Education** – this option is designed for students interested in environmental science and who want to pursue a career in education. Students who will major with this option would logically enter a Master Program in Education. This major was designed for students to be conversant in the field of environmental science, while obtaining a number of credit hours that will satisfy State science teaching certification requirement.
- **Soil Resources and Environmental Sustainability:** This option is designed for students interested in the understanding the essential role of soil, the living thin skin or Earth, to provide services for proper functioning of terrestrial and aquatic ecosystems. The curriculum is highly interdisciplinary; soil scientists apply biology and microbial ecology, chemistry, earth sciences, ecology, hydrology, mineralogy, mathematics, nutrition, toxicology, and physics to understand, sustain, and improve the environment. This option provides students with a wide variety of career opportunities including food and biofuel crop production, soil ecosystem management, climate change and carbon sequestration, and beneficial land application of society’s byproducts / waste. Graduates from this option will be well prepared to pursue graduate studies in soil and other related environmental sciences.
- **Water Science** – this option is intended to attract students with interest in aquatic ecosystem, particularly streams and wetlands. The curriculum will provide a strong foundation in the ecology of these systems, while also emphasis the central role played by hydrological and chemical processes in maintaining the integrity of these threatened ecosystems. Students might seek employment after receiving their BS, or pursue graduate school in ecology, environmental science or natural resources.

SENR Environmental Science

121 Hours - Q2S Curriculum Draft 2.5 – Summer Semester 2012

COURSE & NUMBER	HRS		COURSE & NUMBER	HRS	
UNIVERSITY REQUIREMENTS (GE)			SENR REQUIREMENTS		
Writing Skills	6 Hours		SENR CORE REQUIREMENTS	21 Hours	
English X110 (GE Course 1: Writing Level 1)	3		ENR 1000 (FAES Survey combined with ENR 119)	1	
ENR 2367 (GE Course 2: Writing Level 2)	3		ENR 2100 (Intro to Environmental Science) (GE Open Option 1)	3	
Arts & Humanities	12 Hours		ENR 2300 (Society and Natural Resources) (GE Open Option 2)	3	
GE Literature Course (GE Course 3: Literature) ●★◆	3			3	
GE Arts Course (GE Course 4: Arts) ●★◆	3			1	
GE History Course (GE Course 9: Historical Study) ●★◆	3		ENR 3300 (Intro to Forestry, Fisheries & Wildlife)	3	
GE Culture & Ideas or Historical Study (GE Course 12) ●★◆ [Recommended: ENR 347/3470 (Religion & Environmental Values in America)]	3		ENR 3400 (Psychology of Environmental Problems) or ENR 3500 (Community, Environment & Development)	3	
Social Sciences	6 Hours		ENR 4000 (Natural Resources Policy)	3	
Rural Sociology 105/1500 (Recommended) or GE Social Science (GE Course 10: Social Science 1) ●★◆	3		ENR 3700 (Intro to Spatial Info for Natural Resources)	2	
AED Econ 2001 or Economics X200 (Microeconomics) (GE Course 11: Social Science 2)	3		ENR 4900.01 (Natural Resources Mgt)	3	
Diversity Courses	overlapping		Environmental Science Major Requirements	10 Hours	
Social Diversity in US ●	----		Chemistry 2310 (Intro Organic Chemistry)	4	
Global Studies Course 1 ★◆	----		EEOB 503.01/ EEOB 4310 (Intro to Ecology)	4	
Global Studies Course 2 ★◆	----		ENR 355/3280 (Water Quality Management)	2	
Data Analysis, Quantitative & Logical Skills	8 Hours				
ENR 2000 (Recommended) or GE Equivalent Statistics course (GE Course 6: Data Analysis)	3				
Math 1156 (Calculus for the Biological Sciences) (GE Course 5: Math & Logical Skills)	5		Environmental Science Specializations:	27 Hours	
			Ecosystem Restoration		
			Environmental Science Education		
Natural Sciences	31 Hours		Environmental Molecular Science		
Chemistry 1210 (Intro Chem I)	5		Soil Resources & Environmental Sustainability		
Chemistry 1220 (Intro Chemistry II)	5		Water Science		
Biology 1113 (Intro Biology I)	4				
Biology 1114 (Intro Biology II) or an additional Biological Science or Physical Science Course	4				
Earth Sciences 1121	4				
Physics 1200	5				
ENR 3000 (Intro to Soil Science)	3				
ENR 3001 (Soil Science Laboratory)	1				
Free Electives	0 Hours		MINIMUM HRS FOR GRADUATION	121 Hours	

Ecosystem Restoration Specialization	Units
Required Courses	2
ENR 756 / 5560 Restoration of Ecosystems	2
Ecosystem Science (select 2)	7-9
ENR 656 / 5220 Ecosystems of the World	2
ENR 322 / 3323 Forest Ecosystems	3
ENR 442 / 4260 Soil Management	3
ENR 622 / 5522 Stream Ecology	3
ENR 675 / 5273 Env Fate of Contaminants in Soil & Waters	3
ENR 725 / 5250.01 and 5250.02 Wetland Ecology & Management	5
Ecosystem Restoration (select 2)	
ENR 618 / 5222 Ecological Engineering Science	3
ENR 731 / 7310 Forest Ecosystem Restoration	2
ENR 770 / 7700 Watershed Ecology & Restoration	3
ENR 5279 Urban Soil Assessment and Restoration	3
Methods (select 1)	3-4
ENR 626 / 5345 Methods in Aquatic Ecology	4
ENR 662 / 5362 Wildlife Ecology Methods	3
ENR 720 / 5265 Characterization of Soil in the Field and Laboratory: Sampling	3
ENR 740 / 5266 Field Soil Investigation of Soil Chemistry, Fertility, and Biology	3
ENR 760 / 5225 Ecosystem Modeling	3
Directed Electives	0-7
University GE Total/SENR Core Total	94
Ecosystem Restoration Specialization Total (minimum)	27
Degree Total	121

Environmental Science Education Specialization	Units
Science Education (select one)	2-3
ENR 311 /3611 Environmental Interpretation & Education	2
ENR 410 /4611 Environmental Interpretation & Visitor Services	3
Ecosystem Science (select one course from each sub-category)	9-12
Soils (select one)	
ENR 660 /5262 Soil Chemical Processes & Env Quality	3
ENR 675 /5273 Environ Fate & Impacts of Contaminants	3
Wetlands and Aquatics (select one)	
ENR 620 /5342 Principles of Fisheries Ecology & Mgt	3
ENR 622 /5280 Stream Ecology	4
ENR 725 /5250.01 (3) and 5250.02 (1) Wetland Ecology & Restoration	4
Forests and Wildlife (select one)	
ENR 623 /5360 Principles of Wildlife Ecology & Mgt	3
ENR 734 /5340 Forest Ecosystem Management	3
Methods for Ecosystem Restoration (select one)	3-4
ENR 618 /5222 Ecological Engineering & Science	3
ENR 662 /5362 Wildlife Ecology Methods	3
ENR 626 /5345 Methods in Aquatic Ecology	4
ENR 770 /7700 Watershed Ecology & Restoration	3
Directed Electives (additional courses counting towards State science certification requirements)	10-13
University GE Total/SENR Core Total	94
Environmental Science Education Specialization Total (minimum)	27
Degree Total	121

Environmental Molecular Sciences Specialization	Units
Biological Sciences	4 - 8
Required (select 1)	
MICROBIOL 509 Basic & Practical Microbiology	3
PCMB 630 Plant Physiology I	2
Electives (select 1)	
MICROBIOL 520 & 521 /4100 Microbiology I & II	5
MICROBIOL 665 /5155 Environmental Microbiology	3
MICROBIOL H669 /5169H Microbial Evolution	3
MICROBIOL H610 Bioinformatics & Molecular Microbiology	3
PCMB 625 Plant Metabolic Engineering	2
PCMB 631 Plant Physiology II	2
PLNTPTH 401 General Plant Pathology	4
PLNTPTH 600 Introduction to Bacterial and Viral Pathogens of Plants	4
PLNTPTH 602 Plant-Microbe Interaction	2
PLNTPTH 660 Mycology	3
Environmental Science	5-6
Required (select 1)	
ENR 660 / 5262 Soil Chemical Processes & Environmental Quality	3
Electives (select 1)	
ENR 665 / 5263 Biology of Soil Ecosystems	3
ENR 675 / 5273 Environmental Fate & Impact of Contaminants in Soil & Water	3
ENR 753 / 7530 Soil and Environmental Mineralogy	3
ENR 761 / 6610 Soil and Environmental Biochemistry	2
Geochemistry & Mineralogy	5-7
Required (select 1)	
EARTHSCI 421/4421 Earth Materials	3
EARTHSCI 621/5621 Intro to Geochemistry	3
Electives (select 1)	
EARTHSCI 628/5628 Environmental Isotope Geochemistry	3
EARTHSCI 636/5636 Advanced Topics in Mineralogy and Crystallography	3
EARTHSCI 651/5651 Hydrogeology	4
EARTHSCI 674/5676 Elem. Chem. Analysis using ICPOE and Mass Spec.	3
EARTHSCI (675) 680/5680 (Scanning Electron Microscopy) Deep Earth Geophysics	3
Molecular Biology (select 2)	5-7
Required (select 1)	
BIOCHEM 511 /4511 Introduction to Biological Chemistry	4
BIOCHEM 5613 Biochemistry & Molecular Biology I	3
MG 500 /4500 Molecular Genetics	3
PCMB 622 Plant Molecular Biology	
Electives (select 1)	2-4
ENR 5240 Environmental Molecular Sciences	2
BIOCHEM 5614 Biochemistry & Molecular Biology II	4
MICROBIOL 581.01 /4130 Microbial Genetics	3
MICROBIOL 581.02 /4140 Microbial Genetics	3
MG 605 /4606 and/or MG 606 /4606 Molecular Genetics	4
MG 607 Cell Biology	
MG 622 Plant Genetics & Molecular Biology	
PCMB 623 Plant Genetics and Genomics	
PCMB 648 Plant Cell Biology	
PCMB 650 Biological Microtechnique	
Directed Electives	0-6
University GE Total/SENR Core Total	94
Environmental Molecular Sciences Specialization Total (minimum)	27
Degree Total	121

Soil Resources and Environmental Sustainability Specialization	Units
Required Courses	18-19
ENR 655/671/ 5261 (Environmental Soil Physics)	3
AGSYSMGT 370 (Soil & Water Principles of Hydrology) or ENR 770/7700 (Watershed Ecology & Restoration) or Earth Sciences 550/5550 (Geomorphology)	3-4
ENR 650/5260 (Soil Landscapes: Morphology, Genesis & Classification)	3
ENR 660/5262 (Soil Chemical Processes & Environmental Quality)	3
ENR 665/5263 (Biology of Soil Ecosystems)	3
ENR 580/5270 (Soil Fertility) or ENR 442/4260 (Soil Management)	3
Directed Electives	8-9
Civil Engineering 610: Analysis of Natural and Polluted Waters	
Civil Engineering 722: Open Channel Hydraulics	
Civil Engineering 613: Applied Hydrology	
Earth Sciences 651/5651: Hydrogeology	4
ENR 622/5362 Stream Ecology	4
ENR 725/5250.01 and 5250.02 (Wetland Ecology and Management)	5
ENR 601/5210: Environmental Impact Assessment	3
ENR 602/5211: International Environmental Impact Assessment	3
ENR 626 /5345: Methods in Aquatic Ecology	4
ENR 630 /5271: Forest Soils	3
ENR 651/6451: Water Resources Institutions and Policies	3
ENR 675/5273: Env Fate & Impact of Contam in Soils & Natural Waters	3
ENR 720 / 5265: Characterization of Soil in the Field and Lab: Sampling	3
ENR 730 /5274: Computer Simulation of Soil Processes	2
ENR 740 / 5266: Field Soil Invest of Soil Chemistry, Fertility, and Biology	3
ENR 753 / 7530: Soil Mineralogy	4
ENR 756 / 5560: Rehabilitation/Restoration of Ecosystems	2
ENR 760 / 6610: Soil and Environmental Biochemistry	4
University GE Total/SENR Core Total	94
Soil Resources and Environmental Sustainability Specialization Total (minimum)	27
Degree Total	121

Water Science Specialization	Units
Water Science Required Courses	15
ENR 622 / 5362 Stream Ecology	4
ENR 725 / 5250.01 and 5250.02 Wetland Ecology & Restoration	5
AGSYSMGM 370 Principles of Hydrology	3
ENR 675 / 5273 Env Fate of Contaminants in Soil & Waters	3
Water Resource Courses (select 2)	6 to 7
EEOB 652/655 Limnology	4
ENVENG 613 Applied Hydrology	3
EARTHSCI 206/2206 Principles of Oceanography	3
ENR 627 / 5350.01 Taxonomy and Behavior of Aq. Inverts	3
Management and Restoration Courses (select 1)	2 to 3
ENR 628 / 5355 Aquaculture	3
ENR 620 / 5342 Fisheries Ecology and Management	3
ENR 618 / 5222 Ecological Engineering Science	3
ENR 770 / 7700 Watershed Ecology & Restoration	3
ENR 756 / 5560 Restoration of Ecosystems	2
Methods (select 1)	3 to 4
ENR 626 / 5345 Methods in Aquatic Ecology	4
ENVENG 610 Analysis of Natural and Polluted Waters	3
ENR 760 / 5225 Ecosystem Modeling	3
Directed Electives	0 to 1
University GE Total/SENR Core Total	94
Water Science Specialization Total (minimum)	27
Degree Total	121

Environmental Science			COURSE & NUMBER			COURSE & NUMBER		
COURSE & NUMBER	HRS	✓	COURSE & NUMBER	HRS	✓	COURSE & NUMBER	HRS	✓
UNIVERSITY REQUIREMENTS (GEC)			UNIVERSITY REQUIREMENTS (GEC)					
FAES 100 (University Survey)	1		Arts and Humanities			20 Hours		
Writing Skills			GEC History Course ¹ ★◆			5		
English 110.01 or 110.02 (Composition)	5							
ENR 367 ³ † or LARCH 367 ³ † (2nd Writing Course)	5*		ENR 367 ³ † or LARCH 367 ³ † or other GEC Humanities			5*		
ENR 567 (3rd Writing Course)	5		GEC Literature Course ¹ ◆★● (required)			5		
Data Analysis, Quantitative & Logical Skills			GEC Visual/Performing Art Course ¹ ★◆● (required)			5		
Math 150 (Trig & Elementary Functions)	5		Social Sciences			15 Hours		
Math 151 (Calculus I)	5		AED Econ 200 or Economics 200 (Microeconomics)			5		
Math 152 (Calculus II)	5		ENR 400 (Nat Res Policy)			5		
ENR 222 or Stat 145 or H&CS 260 or Animal Sci 260	5		Third GEC Social Science ¹ ★◆●			5		
Natural Sciences			Diversity Experiences*			0 Hours		
Chem 121 (General Chemistry I)	5		International Issues Non-western/Global Focus¹ ★ A Study Abroad experience may be used toward this requirement with degree unit approval.			5*		
Chem 122 (General Chemistry II)	5		International Issues Western Focus (non-U.S.)¹ ◆ A Study Abroad experience may be used toward this requirement with degree unit approval.			5*		
Chem 123 (General Chemistry III)	5		Social Diversity in the U.S.¹ ●			5*		
Chem 251 (Organic Chemistry I)	3		ENR MAJOR REQUIREMENTS			16 Hours		
Chem 252 (Organic Chemistry II)	3		EEOB 503.01 (Intro to Ecology)			4		
Biology 113 (Energy Transfer & Development)	5		EEOB 503.02 (Ecology Laboratory)			2		
Biology 114 (Form, Function, Diversity & Ecology)	5		Earth Sci 121 (Intro to Physical Geology)			5		
ENR CORE REQUIREMENTS			Physics 111 (Mechanics & Heat)			5		
ENR 201 (Intro to Environmental Science)	5		Physics 112 (Electricity, Magnetism & Light)			Recommended		
ENR 203 (Society and Natural Resources)	5		Land Option			32 Hours		
ENR 300.01 (Intro to Soil Science)	3		Soil Science Option					
ENR 300.02 (Soil Science Lab)	2		Waste Management Option					
Select Two ² : ENR 311 (Foundations in Env Comm & Ed), ENR 319 (Forestry, Fisheries & Wildlife), 324 (Nat Res Photointerpretation), ENR 340 (Parks & Rec), ENR 355 (Water Quality), ENR 333 (Silviculture)	3		Water Option					
ENR 606.01 (Natural Resources Managementt)	5		MINIMUM HRS FOR GRADUATION			181 Hours		
Free Electives ★◆●			9 Hours					

¹ From GEC list.

² Selected course may not be double counted in the major.

³ Other 367 courses may be substituted for the 2nd writing requirement. Five additional hours required from Part B of Arts & Humanities (Analysis of Texts & Works of Art).

† Fulfills both GEC 2nd writing & GEC Cultures & Ideas requirements simultaneously.

* Requirements may be double counted with another GEC requirement. If you do not overlap these courses, additional coursework will be required to complete your degree requirements.

◆ Students are permitted and recommended to double count their GEC International Issues: Non-western/Global requirement with another GEC category.

★ Students are permitted and recommended to double count their GEC International Issues: Western Focus (non U.S.) requirements with another GEC category.

● Students are permitted and recommended to double count their GEC Social Diversity requirement with another GEC category.

Land Option	Credit Hours	
AGSYSMGT 370 (Soil & Water Principles of Hydrology) or EARTHSCI 204 (Water Resources)	3-5	
ENR 675 (Environmental Fate & Impact of Contaminants in Soil & Water) or ENR 618 (Ecological Engineering & Science)	3-4	
ENR 756 (Rehabilitation/Restoration of Ecosystems) or ENR 725 (Wetland Ecology & Management)	3 - 5	
Additional Specialization Courses **	18-23	
	32 Hours	

** Courses requiring advisor approval. Additional courses selected in ENR or related disciplines in consultation with faculty advisor.

Suggested Specialization Courses** (other courses could be added)	Credit Hours	
AGSYSMGT 370 (Principles of Hydrology)	3	
AGSYSMGT 371 (Surveying for Agric. Environmental Systems)	2	
C&R PLAN 310 (Introduction to City and Regional Planning)	4	
C&R PLAN 761 (Land-Use Controls)	4	
EARTHSCI 203 (Geology and the Environment)	5	
EARTHSCI 550 (Geomorphology)	5	
EEOB 210 (Local Flora)	5	
EEOB 720 (Community Ecology and Ecosystems)	5	
ENR 221 (Biology and Identification of Woody Forest Plants)	5	
ENR 322 (Forest Ecosystems)	5	
ENR 324 (Natural Resources Photointerpretation)	3	
ENR 333 (Silviculture)	5	
ENR 442 (Soil Management)	5	
ENR 550 (Pedology)	5	
ENR 601 (Evaluation of Environmental Impact)	4	
ENR 602 (International Environmental Impact Assessment)	5	
ENR 645 (Soils of the Tropics)	3	
ENR 675 (Fate of Pollutants in Soils and Natural Waters)	3	
ENR 660 (Soil Chemical Processes and Environmental Quality)	5	
ENTOMOL 531 (Pesticides, the Environment and Society)	3	
GEOG 210 (Physical Geography & Environmental Issues)	5	
GEOG 220 (Introduction to Physical Geography)	5	
GEOG 607 (Fundamentals of Geographic Information Systems)	4	
GEOG 685 (Intermediate Geographic Information Systems)	5	
GEOG 687 (Design and Implementation of Geographic Information)	5	

Soil Science Option	Credit Hours	
AGSYSMGT 370 (Soil & Water Principles of Hydrology) or EARTHSCI 204 (Water Resources)	3-5	
ENR 675 (Environmental Fate & Impact of Contaminants in Soil & Water) or ENR 618 (Ecological Engineering & Science)	3-4	
ENR 756 (Rehabilitation/Restoration of Ecosystems) or ENR 725 (Wetland Ecology & Management)	3-5	
ENR 540 (Urban & Sports Turf Soils)	3	
ENR 650 (Soil Landscapes: Morphology, Genesis & Classification)	5	
ENR 660 (Soil Chemical Processes & Environmental Quality)	5	
Additional Specialization Courses **	5-10	
	32 Hours	

** Courses requiring advisor approval. Additional courses selected in ENR or related disciplines in consultation with faculty advisor.

Suggested Specialization Courses** (other courses could be added)	Credit Hours	
ENR 442 (Soil Management)	5	
ENR 580 (Soil Fertility and Fertilizers)	3	
ENR 645 (Soil of the Tropics)	3	

Waste Management Option	Credit Hours	
AGSYSMGT 370 (Soil & Water Principles of Hydrology) or EARTH SCI 204 (Water Resources)	3-5	
ENR 675 (Environmental Fate & Impact of Contaminants in Soil & Water) or ENR 618 (Ecological Engineering & Science)	3-4	
ENR 756 (Rehabilitation/Restoration of Ecosystems) or ENR 725 (Wetland Ecology & Management)	3-5	
ENR 653 (Solid Waste Management)	5	
Additional Specialization Courses **	13-18	
	32 Hours	

** Courses requiring advisor approval. Additional courses selected in ENR or related disciplines in consultation with faculty advisor.

Suggested Specialization Courses** (other courses could be added)	Credit Hours	
AGSYSMGT 550 (Pollution Control and Waste Utilization)	3	
CIVIL EN 610 (Analysis of Polluted Water)	3	
CIVIL EN 771 (Radioactive Waste Management)	3	
ENR 355 (Water Quality Management)	3	
ENR 580 (Soil Fertility and Fertilizers)	3	
ENR 675 (Environmental Fate & Impact of Contaminants in Soil and Water)	3	
ENR 660 (Soil Chemical Processes and Environmental Quality)	5	
MICRBIOL 509 (Basic and Practical Microbiology)	5	
MICRBIOL 520 (General Microbiology)	6	
MICRBIOL 521 (General Microbiology II)	6	
MICRBIOL 665 (Environmental Microbiology)	3	

Program Option & Specialization Course Selection Guide — WATER OPTION

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Quarter Advising Sheets

Water Option	Credit Hours	
AGSYSMGT 370 (Soil & Water Principles of Hydrology)	3	
EARTH SCI 204 (Water Resources)	5	
ENR 675 (Environmental Fate & Impact of Contaminants in Soil & Water) or ENR 618 (Ecological Engineering & Science)	3-4	
ENR 756 (Rehabilitation/Restoration of Ecosystems) or ENR 725 (Wetland Ecology & Management)	3-5	
Additional Specialization Courses**	15-18	
	32 Hours	

** Courses requiring advisor approval. Additional courses selected in ENR or related disciplines in consultation with faculty advisor.

Suggested Specialization Courses** (other courses could be added)	Credit Hours	
CIVIL EN 510 (Principles of Hydraulics)	3	
CIVIL EN 610 (Analysis of Natural and Polluted Waters)	3	
EARTH SCI 651 (Hydrogeology)	5	
EARTH SCI 718 (Geochemistry of Natural Waters)	5	
EEOB 611 (Higher Aquatic Plants)	5	
EEOB 621 (Ichthyology) or EEOB 626 (Biology of Fishes)	5	
EEOB 647 (Plankton)	5	
EEOB 652 (Limnology) or EEOB 655 (Limnology)	5	
ENR 355 (Water Quality Management)	3	
ENR 540 (Urban and Sports Turf Soils)	3	
ENR 580 (Soil Fertility and Fertilizers)	3	
ENR 660 (Soil Chemical Processes and Environmental Quality)	5	
ENR 675 (Environmental Fate & Impact of Contaminants in Soil and Water)	3	
ENR 725 (Wetland Ecology and Management)	5	
ENR 756 (Rehabilitation/Restoration of Ecosystems)	3	
ENTOMOL 612 (Aquatic Entomology)	5	
GEOG 520 (Climatology)	5	
MICRBIOL 520 (General Microbiology I)	6	
MICRBIOL 521 (General Microbiology II)	6	
MICRBIOL 634 (Water Microbiology)	3	
MICRBIOL 655 (Environmental Microbiology)	5	

SUGGESTED 4 YEAR SEMESTER PLAN FOR BS-ENVSCI

FIRST YEAR**Autumn Semester**

ENR 1000	1
MATH 1156	5
CHEM 1210	5
ENR 2100	3
ENGLISH X110 or GE History/Soc Sci/Humanities	3
	<hr/>
	17

Spring Semester

ENR 2000 or Stat X145	3
CHEM 1220	5
ENR 2300	3
ENR 3300	3
ENGLISH X110 or GE History/Soc Sci/Humanities	3
	<hr/>
	17

May Term**SECOND YEAR****Autumn Semester**

CHEM 2310 or ENR 3000/3001	4
ES 1121 or PHYSICS 1200	4-5
BIOLOGY 1113	4
ENR 3400/3500 or AED ECON 2001	3
GE History/Soc Sci/Humanities or GE second writing or GE History/Soc Sci or Humanities	0-3
	<hr/>
	14-17

Spring Semester

CHEM 2310 or ENR 3000/3001	4
ES 1121 or PHYSICS 1200	4-5
BIOLOGY 1114 or BIO/PHYS Sci	4
ENR 3400/3500 or AED 2001	3
GE History/Soc Sci/Humanities or GE second writing or GE History/Soc Sci or Humanities	0-3
	<hr/>
	14-17

May Term**THIRD YEAR****Autumn Semester**

EEOB X503 or ENR 3280	3-4
ENR 4000 or ENVSCI Specialization	3
ENR 3700 or ES Specialization	2
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2-3
	<hr/>
	13-15

Spring Semester

EEOB X503 or ENR 3280	3-4
ENR 4000 or ENVSCI Specialization	3
ENR 3700 or FFW Specialization	2
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2-3
	<hr/>
	13-15

May Term**FOURTH YEAR****Autumn Semester**

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2
	<hr/>
	14

Spring Semester

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2
	<hr/>
	14

May Term

Transition Plan - 4 YEAR SEMESTER PLAN FOR BS-ENVSCI
1st year under Quarters with remaining three years under Semesters

FIRST YEAR**Autumn Quarter 2011**

MATH 151	5
CHEM 121	5
ENR 201	5
FAES 100	1

16**Winter Quarter 2012**

MATH 152	5
CHEM 122	5
ENGLISH 110	5

15**Spring Quarter 2012**

ENR 222 or Stat 145	5
CHEM 123	5
ENR 203	5

15**SECOND YEAR****Autumn Semester**

CHEM 2310 or ENR 3000/3001	4
ES 1121 or PHYSICS 1200	4-5
BIOLOGY 1113	4
ENR 3400/3500 or AED ECON 2001	3
GE History/Soc Sci/Humanities or GE second writing or ENR 3300	3

17**Spring Semester**

CHEM 2310 or ENR 3000/3001	4
ES 1121 or PHYSICS 1200	4-5
BIOLOGY 1114 or BIO/PHYS Sci	4
ENR 3400/3500 or AED 2001	3
GE History/Soc Sci/Humanities or GE second writing or GE History/Soc Sci or Humanities	3

17**May Term****THIRD YEAR****Autumn Semester**

EEOB X503 or ENR 3280	3-4
ENR 4000 or ENVSCI Specialization	3
ENR 3700 or ES Specialization	2
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2-3

13-15**Spring Semester**

EEOB X503 or ENR 3280	3-4
ENR 4000 or ENVSCI Specialization	3
ENR 3700 or FFW Specialization	2
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2-3

13-15**May Term****FOURTH YEAR****Autumn Semester**

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2

14**Spring Semester**

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2

14**May Term**

Transition Plan - 4 YEAR SEMESTER PLAN FOR BS-ENVSCI
1st and 2nd years under Quarters with remaining two years under Semesters

FIRST YEAR**Autumn Quarter**

MATH 151	5
CHEM 121	5
ENR 201	5
FAES 100	1

16**Winter Quarter**

MATH 152	5
CHEM 122	5
ENGLISH 110	5

15**Spring Quarter**

ENR 222 or Stat 145	5
CHEM 123	5
ENR 203	5

15**SECOND YEAR****Autumn Quarter**

CHEM 251	4
BIOLOGY 113	5
ENVSCI MAJOR	3
GEC 2 nd writing	5

17**Winter Quarter**

CHEM 252	4
BIOLOGY 114	5
ENR 300.01/.02	5
GEC COURSE	5

19**Spring Quarter**

PHYSICS 111	5
EEOB 405.01	4
EEOB 405.02	2
AED ECON 200	5

16**THIRD YEAR****Autumn Semester**

ENR 3280	3
ENR 4000 or ENVSCI Specialization	3
ENR 3700 or ES Specialization	2
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2-3

13-14**Spring Semester**

ENR 3280	3
ENR 4000 or ENVSCI Specialization	3
ENR 3700 or ENVSCI Specialization	2
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2-3

13-14**May Term****FOURTH YEAR****Autumn Semester**

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2

14**Spring Semester**

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2

14**May Term**

Transition Plan - 4 YEAR SEMESTER PLAN FOR BS-ENVSCI
1st, 2nd and 3rd years under Quarters with a remaining year under Semesters

FIRST YEAR**Autumn Quarter 2011**

MATH 151	5
CHEM 121	5
ENR 201	5
FAES 100	1

 16
Winter Quarter 2012

MATH 152	5
CHEM 122	5
ENGLISH 110	5

 15
Spring Quarter 2012

ENR 222 or Stat 145	5
CHEM 123	5
ENR 203	5

 15
SECOND YEAR**Autumn Quarter 2011**

CHEM 251	4
BIOLOGY 113	5
ENVSCI MAJOR	3
GEC 2 nd writing	5

 17
Winter Quarter 2012

CHEM 252	4
BIOLOGY 114	5
ENR 300.01/.02	5
GEC COURSE	5

 19
Spring Quarter 2012

PHYSICS 111	5
EEOB 405.01	4
EEOB 405.02	2
ENVSCI MAJOR	5

 16
THIRD YEAR**Autumn Quarter**

ENR 567	5
GEC COURSE	5
ENVSCI MAJOR	5
ES SPECIALIZATION	3

 18
Winter Quarter

ENR 324	3
ENR 355	3
ENVSCI MAJOR	5
GEC COURSE	5

 19
Spring Quarter

ENVSCI MAJOR	4
ENVSCI MAJOR	5
ES SPECIALIZATION	4
GEC COURSE	5

 18
FOURTH YEAR**Autumn Semester**

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2

 14
Spring Semester

ENR 4900.01 or ENVSCI Specialization	3
ENVSCI Specialization	3
ENVSCI Specialization	3
GE History/Soc Sci or Humanities	3
ENVSCI Specialization	2

 14
May Term

Unit	Qtr # plus suffix	Semester #	Sem units	1c: Course Title Long note: various colors in rows below are not important, but indicate some sort of revised or new course information	rank
ENR	100/119.01 ,02,03	1000	1	Environment and Natural Resources Survey	freshman, sophomore, junior, senior
ENR	100H	1000H	1	Environment and Natural Resources Survey	honors freshman
ENR	101	1010	4	Soils in Our Environment	freshman, sophomore
RURLSOC	105	1500	3	Introduction to Rural Sociology	Freshman, Sophomore, Junior, Senior
ENR	222	2000	3	Natural Resources Data Analysis	Sophmores freshmen,
ENR	201	2100	3	Introduction to Environmental Science	sophomores, juniors, seniors

each major
 will get
 assigned to a
 different
 section
 (rather than
 doing
 1000.01, .02,
 etc)

(Planet Earth -
 The Fragile
 Skin) had
 been
 discussed as
 a new title?

ENR	155	2155	4	Energy and Environment Natural Resources	freshman, sophomore, junior, senior
ENR	289	2191	1 or 2	Practicum	sophomore, junior, senior
ENR	203	2300	3	Society and Natural Resources	Freshmen, Sophomores
ENR	232	2320	3	Landscape Maintenance	Freshman, Sophomore, Junior, Senior
ENR	230	2360	3	Ecology and Conservation of Birds	Freshman, Sophomore, Junior and Senior
ENR	567	2367	3	Communicating Environmental and Natural Resources Information	freshman, sophomore, junior
ENR	300.01	3000	3	Soil Science	sophomore, junior, senior
ENR	300.02	3001	1	Soil Science Laboratory	sophomore, junior, senior
ENR	355	3280	2	Water Quality Management	sophomore freshman,
ENR	319	3300	3	Introduction to Forestry Fisheries and Wildlife	sophomore, junior, senior

old 567
 converted to
 new GE 2367.
 "issues" was
 considered in
 title in place
 of
 "information"

ENR	221	3321	3	Biology and Identification of Woody Forest Plants	freshman, sophomore, junior, senior
ENR	322	3322	3	Forest Ecosystems	freshman, sophomore, junior, senior
ENR	323	3323	3	Forest Biometrics	freshman, sophomore, junior, senior
ENR	333	3333	3	Silviculture	freshman, sophomore, junior, senior
ENR	350.01	3335.01	2	Introduction to Wildland Fire Management	freshman, sophomore, junior, senior
ENR	350.02	3335.02	1	Wildland Fire Management Laboratory	freshman, sophomore, junior, senior
ENR	3XX	3400	3	Psychology of Environmental Problems	Freshman, Sophomore, Junior
ENR	347	3470	3	Religion and Environmental Values in America	freshman, sophomore, junior
ENR/RS	3xy	3500	3	Community, Environment and Development	freshman, sophomore, junior, senior
WS/ENR	3xx	3530	3	Women, Environment and Development	freshman, sophomore, junior, senior
RURLSOC	378	3580	3	Social Groups in Developing Societies	freshman, sophomore, junior, senior

GE, Arts and Humanities, Cultures and Ideas

ENR	340	3600	2	Management of Public Lands	sophomore, junior
ENR	311	3611	2	Foundations for Environmental Communications, Education and Interpretation	Soph,Junior,Senior
ENR	324.02	3700	2	Introduction to Spatial Information for Environment and Natural Resources	sophomore, junior, senior
ENR	324.01	3750	3	Applied Remote Sensing for Environment and Natural Resources	junior, senior
ENR	400	4000	3	Environmental and Natural Resources Policy	sophomore, junior, senior
ENR	689	4191	2	Professional Practice in Environment and Natural Resources	freshman, sophomore, junior, senior
ENR	693	4193	1 to 3	Individual Studies in Environment and Natural Resources	freshman, sophomore, junior, senior
ENR	694/494	4194	1 to 3	Group Studies	freshman, sophomore, junior, senior, masters, doctoral, professional

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 Full SENR semester course
 list, including courses
 required for SENR
 programs and all elective
 courses

					freshman, sophomore, junior, senior, masters, doctoral, professional
ENR	694	4194	1 to 3	Group Studies	junior, senior
ENR	442	4260	3	Soil Resource Management Sustainable Forest Products	junior, senior
ENR	432	4320	3	Zoo Science and Management	junior, senior
ENR	415	4360	2		sophomore, junior, senior
ENR	694	4400	3	Law and Legal Process	Freshman, Sophomore,
RURLSOC	542	4500	3	Leadership and Community Development	Junior and Senior
ENR	597	4597	3	Contemporary Issues in Environment and Natural Resources	junior, senior, masters, doctoral, professional
ENR	510	4610	3	Natural History of Ohio Environmental Interpretation and Visitor Services	freshman, sophomore, junior, senior, graduate
ENR	410	4611	3	Environment and Natural Resources Law Enforcement	Soph, Junior, Senior
ENR	448	4648	3		sophomore, juni or, senior
ENR	693	4683	1 to 3	Undergraduate Research	Soph, Junior, Senior
ENR	683H	4683H	3	Honors Projects	junior, senior

ENR	606.01	4900.01	3	Environment and Natural Resources Management	Senior
ENR	606.02	4900.02	3	Environment and Natural Resources Management for Forestry Fisheries and Wildlife	junior, senior junior, senior, masters, doctoral, professional
ENR	601	5210	3	Evaluation of Environmental Impact	junior, senior, masters, doctoral, professional
ENR	602	5211	3	International Environmental Impact Assessment	junior, senior, masters, doctoral, professional
ENR	656	5220	2	Ecosystems of the World: Temperate, Boreal and High Latitude Ecosystems	senior, masters, doctoral, professional
ENR	618	5222	3	Ecological Engineering and Ecosystem Restoration	junior, senior, masters, doctoral, professional
ENR	760	5225	3	Ecosystem Modeling	junior, senior, masters, doctoral, professional
ENR	894	5240	2	Environmental Molecular Sciences	senior, masters, doctoral
ENR	725.01	5250.01	3	Wetland Ecology and Restoration	senior, masters, doctoral, professional

ENR	725.02	5250.02	1	Wetland Field Laboratory	senior, masters, doctoral, professional
ENR	650	5260	3	Soil Landscapes: Morphology, Genesis and Classification	junior, senior, masters, doctoral
ENR	655/671	5261	3	Environmental Soil Physics	senior, masters, doctoral, professional Junior, senior, masters, doctoral
ENR	660	5262	3	Soil Chemical Processes and Environmental Quality	professional junior, senior, masters, doctoral
ENR	665	5263	3	Biology of Soil Ecosystems	junior, senior, masters, doctoral
ENR	720	5265	2	Characterization of Soil in the Field and Laboratory: Sampling	masters, doctoral, professional junior, senior, masters, doctoral, professional
ENR	740	5266	3	Field Soil Investigation: Soil Chemistry, Fertility and Biology	masters, doctoral, professional
ENR	580	5270	3	Soil Fertility	Juniors, Seniors, Masters

671 and 655
are absorbed
into 5261

"and
fertilizers"
used to be
part of the
title

ENR	630	5271	3	Soils of Forest Ecosystems	Juniors, Seniors, Masters
ENR	540	5272	3	Urban and Sports Turf Soils	junior, senior, graduate
ENR	675	5273	3	Environmental Fate and Impact of Contaminants in Soil and Water	Junior, senior, masters, doctoral, professional
ENR	730	5274	2	Computer Simulation of Soil Hydrological and Biogeochemical Processes	junior, senior, masters, doctoral, professional
ENR	xxx	5279	3	Urban Soil and Ecosystem Services: Assessment and Restoration	junior, senior, masters, doctoral, professional
ENR	622	5280	4	Stream Ecology	sophomore, junior, senior, masters, doctoral, professional
ENR	635	5320	3	Forest Management	seniors, masters, doctoral, professional
ENR	631	5322	3	Arboriculture	seniors, masters, doctoral, professional

ENR	736	5325	3	Public Forest and Lands Policy	junior, senior, masters, doctoral, professional
ENR	734	5340	3	Forest Ecosystem Management	Senior, masters, doctoral, professional sophomore, junior, senior, masters,
ENR	620	5342	3	Principles of Fisheries Ecology and Management	doctoral, professional sophomore, junior, senior, masters, doctoral,
ENR	626	5345	4	Methods in Aquatic Ecology	professional sophomore, junior, senior, masters, doctoral,
ENR	627	5350.01	3	Taxonomy and Behavior of Aquatic Invertebrates	doctoral, professional sophomore, junior, senior, masters,
ENR	627x	5350.02	3	Taxonomy and Behavior of Fishes	doctoral, professional
ENR	628	5355	3	Aquaculture	junior, senior, masters, doctoral
ENR	623	5360	3	Principles of Wildlife Ecology and Management	ranks 3+
ENR	662	5362	3	Wildlife Ecology Methods	junior

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 Full SENR semester course
 list, including courses
 required for SENR
 programs and all elective
 courses

ENR	624A	5364.01	3	Mammalian Wildlife Biology and Management	junior or senior
ENR	624B	5364.02	3	Avian Wildlife Biology and Management	junior or senior
ENR	625	5370	2	Management of Wildlife Habitat	junior or senior
ENR	629	5375	2	Ecology and Management of Wetlands Birds	senior, masters, doctoral, professional junior, senior,
ENR	648H	5448H	3	Tragedy of the Commons? Environment, Government and Collective Action	masters, doctoral, professional doctoral,master s,
RURLSOC	662	5500	3	Diffusion of Innovations	professional,se nior,junior Freshman, Sophomore,
RURLSOC	622	5520	3	Amish Society	Junior, Senior masters,
RURLSOC	733	5530	3	Sociology of Agriculture and Food Systems	doctoral, professional junior, senior, masters,
RURLSOC	744	5540	3	Population, Place and Environment	doctoral, professional seniors, masters,
ENR	756	5560	2	Rehabilitation/Restoration of Ecosystems	doctoral, professional

was: Rural
 Sociology
 Demography

RURLSOC	678	5570	3	Women in Rural Society	doctoral, masters, professional, junior, senior, sophomore	title used to include: of Domestic Development
RURLSOC	688	5580	3	Social Impact Assessment	junior, senior, masters, doctoral	
ENR	611	5611	2	Great Lakes Education Workshop	junior, senior, masters, doctoral, professional	was "I", and "II" not converted
ENR	614	5614	2	Marine and Aquatic Education	junior, senior, masters, doctoral, professional	
ENR	640	5640	4	Natural Resources Program Planning	junior, senior, masters	
ENR	642	5642	3	Environment and Natural Resources Administration	Junior, Senior, Masters	
ENR	649	5649	3	Wildlife Conservation Policy	junior, senior, masters, doctoral, professional	
ENR	690	5690	2	Workshop in Environmental Education	junior, senior, masters, doctoral, professional	

ENR	799	5699	1	Current Topics in Environment and Engineering	freshman, sophomore, junior, senior, masters, doctoral, professional	
ENR	697	5797	1 to 15	Study at a Foreign Institution	junior, senior, masters, doctoral, professional	was Long-term Study Abroad
RURLSOC	697	5797	1 to 15	Study at a Foreign Institution	junior, senior, masters, doctoral, professional	
ENR	800	6000	2	Research in Environment and Natural Resources	Masters, doctoral	
ENR	693	6193	1 to 3	Individual Studies in Environment and Natural Resources	masters, doctoral, professional	
ENR	651	6451	3	Water Law	senior, masters, doctoral, professional	was Water Resources Institutions and Policies
RURLSOC	666	6500	3	Rural Poverty	doctoral, professional, masters, senior, junior	title was Sociological Theory Applied to Domestic Development
RURLSOC	788	6550	3	The Change Agent	masters, doctoral, professional	

ENR	761	6610	2	Soil and Environmental Biochemistry	masters, doctoral, professional (junior, senior possible)
ENR	731	7310	2	Principles and Applications of Forest Ecosystem Restoration	Masters, doctoral
ENR	733	7333	3	Successional Dynamics of Forests	masters, doctoral Masters, Doctoral, some seniors
ENR	738	7380	3	Climate and Society	seniors
ENR	7XX	7400	2	Communicating Environmental Risk	Masters, Doctoral, Professional
ENR	750	7500	3	Resolving Social Conflict	masters, doctoral, professional
ENR	752	7520	3	Environmental Science and Law	senior, masters, doctoral, professional seniors, masters, doctoral
ENR	753	7530	3	Soil Mineralogy	senior, masters, doctoral
RURLSOC	788	7542	3	The Change Agent: Sociological Theory Applied to Domestic Development	Masters, Doctoral, Professional

RURLSOC	888	7550	3	Rural Community Development in Theory and Practice	masters, doctoral, professional	was: Social Action in Community Development
RURLSOC	766	7560	3	Environmental Sociology	Masters, doctoral, professional seniors,	
RURLSOC	742	7600	3	Concepts and Theories in Rural Sociology	masters, doctoral	
ENR	770	7700	3	Watershed Ecology and Restoration	masters, doctoral	
ENR	893	7888	1 to 3	MENR Project	masters	
ENR	812	8120	2	Spatial Methods in Environment and Natural Resources	masters, doctoral, professional	
ENR	815	8150	3	Advanced Environment, Risk and Decision Making	Masters, Doctoral, Professional	
ENR	835	8350	3	Ecosystem Management Policy	masters, doctoral, professional	
ENR	840	8400	2	Theoretical Foundations in the Human Dimensions of Ecosystem Management	masters, doctoral, professional	
RURLSOC	892	8500	3	Development Sociology in Theory and Practice	masters, doctoral, professional	was: Rural Sociology of Development and Social Change

ENR	851	8510	3	Research Design for Environmental Social Sciences	masters, doctoral Masters, Doctoral,
ENR	871	8710	3	Soils and Climate Change Quantitative Methods for Environment and Natural Resources	Professional masters, doctoral, professional
ENR	822	8780	3	Research Paradigms	masters, doctoral professional
ENR	899.01	8890.01	1 to 12	Fish and Wildlife Management Seminar	masters, doctoral professional
ENR	899.02	8890.02	1 to 12	Watershed Ecology and Management Seminar	masters, doctoral professional
ENR	899.03	8890.03	1 to 12	Environmental Science Seminar	masters, doctoral professional
ENR	899.04	8890.04	1 to 12	Soil Science Seminar	masters, doctoral professional
ENR	899.05	8890.05	1 to 12	Forest Science and Management Seminar	masters, doctoral professional

title was:
 Human
 Dimensions
 Theory
 Building in
 Natural
 Resources

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 Full SENR semester course list, including courses required for SENR programs and all elective courses

ENR	899.06	8890.06	1 to 12	Environmental Policy and Decision-Making Seminar	masters, doctoral, professional
ENR	899.07	8890.07	1 to 12	Environmental Education and Communication Seminar	masters, doctoral, professional
ENR	899.08	8890.08	1 to 12	Parks and Recreation Management Seminar	masters, doctoral, professional
ENR	xxx	8890.09	1 to 12	Rural Sociology Seminar	professional
ENR	897	8897	1	Research Proposal Symposium	graduate, masters,
ENR	880	8980	1	Environment and Natural Resources Seminar	doctoral, professional
ENR	999	8998	3 to 15	Research	Masters, doctoral
Unit	Qtr # plus suffix	Semester #	Sem units	1c: Course Title Long	rank
ENR	100H	1000H	1	Environment and Natural Resources Survey	honors freshman
ENR	683H	4683H	3	Honors Projects	junior, senior
ENR	590H	4890H	1	Honors Colloquium	Junior
ENR	648H	5448H	3	Tragedy of the Commons? Environment, Government and Collective Action	junior, senior, masters, doctoral, professional
ENR	119.01	xx (1000)	1	Survey of Park and Policy Careers	freshman, sophomore, junior, senior

119 is merged w 100 as 1000

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Full SENR semester course
list, including courses
required for SENR
programs and all elective
courses

ENR	119.02	xx (1000)	1	Professional Survey of Forestry, Fisheries and Wildlife	freshman, sophomore	119 is merged w 100 as 1000
ENR	119.03	xx (1000)	1	Professional Survey of Environmental Science	freshman, sophomore, junior, senior	119 is merged w 100 as 1000

School of Environment and Natural Resources **Transition Plan for ENR Majors**

This transition plan covers all existing ENR undergraduate majors, including:

Environmental Policy and Decision Making Major (*modified in title (was Environmental Policy and Management) and three specializations added*)

Environmental Science Major (*modified from four to five specializations*)

Forestry, Fisheries, and Wildlife Major (*converted as semester equivalent*)

Natural Resource Management Major (*modified in title (was Parks, Recreation & Tourism) and three specializations added*)

Students in all ENR majors may complete the major as it was offered in quarters, simply by completing the semester equivalents of the courses they would have completed to meet the requirements of the major under quarters. Each major includes a sufficient selection of converting courses to make completion possible; any courses not converted to semesters will simply be unavailable as options starting in Autumn of 2012. There will be no attempt to create bridge courses.

Current students in ENR majors will be contacted before the start of the Autumn 2011 quarter with a list of available semester courses to complete their major; any courses that will be terminated in semesters will be highlighted with encouragement for interested students to take them in 2011-2012.

Students finishing their degrees under semesters in the **Environmental Policy and Decision Making** Major and the **Natural Resources Management** Major will have the option of either completing their major with no specialization as these degrees were offered in quarters, or if their course of study allows them to do so, they may complete their degree under one of the three specializations now specified in these two majors. Students in the **Environmental Science** Major will have the option of either completing their current specialization with semester equivalent courses, or changing their specialization to one of the re-named specializations offered under semesters. Students completing the **Forestry, Fisheries, and Wildlife** Major (FFW) will see no change in their specialization options, and will simply complete their specialization with semester equivalent versions of courses, as suggested in the four year plan above and as guided by the FFW semester advising sheets above.

SENR Semester Programs: Assessment Plans

SENR programs do not have assessment plans already on file with the University. The following selections below have been indicated in the online program proposal system to describe the preliminary assessment plans for SENR programs. Full plans for undergraduate and graduate programs will be completed for submission to the University in September of 2011, in collaboration with Dr. Warren Flood and his work to finalize assessment plans in the College of Food, Agricultural and Environmental Sciences. An important basis for assessment is the set of program learning goals detailed in the different curriculum maps for each SENR undergraduate major and several SENR graduate programs. Details have been added below to specify the measures currently used to assess SENR programs. Different assessment methods are used across the range of SENR degree programs, as indicated below,

Direct Methods of Assessment:

Undergraduate:

Standardized tests:

-Certification or licensure examinations for FFW students: *The Wildlife Society, American Fisheries Society, and Society of American Foresters certifications are available to students completing various specializations in the FFW major.*

Classroom Assignments:

-Other classroom assignment methods: *Current SENR students must complete ENR 567 (3rd writing course), which evaluates written and oral communication skills. Portions of what is currently assessed in ENR 567 will be shifted in semesters to ENR 2367 (a 2nd writing course), ENR 4900.01/4900.02 (the ENR capstone courses, with integrative projects and assignments, written and oral, to assess students' mastery of a range of ENR knowledge and skills), and to an additional writing assessment component that will be added to an upper level required course in each major that includes a significant writing component (e.g., 4900.01, 662/5362, 642/5642). In this latter case, writing assignments in these upper level courses will be graded both by the content instructor and by a qualified writing instructor designated by the School, to assure that students achieve a satisfactory level of writing mastery.*

Evaluation of a body of work produced by the student:

-Capstone course reports, papers, or presentations: *ENR 606.01/4900.01 and 606.02/4900.02 are the SENR capstone courses, which require students to demonstrate an integrative knowledge and proficiency following on their environment and natural resource education and training in SENR.*

Graduate:

Direct assessment methods specifically applicable to graduate programs:

- Candidacy exams: *PhD students must complete a written and oral candidacy exam prior to proceeding with their dissertation research.*
- Research proposals written: *PhD students must complete a research proposal approved by their committee to proceed with dissertation research; MS students enroll in a research course (800/8998) and a research proposal symposium (897/8897) to develop and present their thesis research proposal; MENR students must gain approval of their project topic by their advisory committee and the director of graduate studies, and their independent project and program of study must also be approved by their committee.*
- Thesis/dissertation oral defense and/or other oral presentation: *MS and PhD students must pass an oral defense, and also give a public thesis presentation (PhD students present their research in the SENR seminar series); MENR students complete an oral Final Master's Examination.*
- Thesis/dissertation (written): *MS and PhD students complete written theses and dissertations; MENR students complete a written Final Master's Examination.*

Indirect Methods of Assessment:

Undergraduate:

Surveys and Interviews:

- Student survey: *SENR social science faculty have created a pre- and post-test survey instrument for SENR students, which students complete upon entering SENR and then again in their final semester. The survey evaluates environmental learning, attitudes, career interests, and other measures of student progress and experiences linked to SENR program objectives, and these results inform program vision and revision.*
- Alumni survey: *SENR social science faculty periodically complete phone interviews with SENR alumni to examine their long-term learning, job success, and retrospective views of SENR programs; these results inform program vision and revision.*
- Student Evaluation of Instruction: *SENR instructors use SEI's to evaluate their own teaching; SENR administration uses SEI's in part to gauge instructor success.*
- Student interviews or focus groups: *SENR director and other administrators conduct exit interviews with a sample of graduating SENR students to evaluate their success and satisfaction with SENR programs. These interviews inform shaping and direction of current and future programs.*

Graduate:

Additional types of indirect evidence:

-Job or post-baccalaureate education placement: *SENR administrators keep track of job placement of graduates as a measure of program success.*

How the program uses or will use the evaluation data to make evidence-based improvements to the program periodically (select all that apply):

-Meet with students directly to discuss their performance: *Meetings with students occur throughout the SENR curriculum, particularly in relation to term projects, capstone projects, and graduate theses and projects.*

-Analyze and discuss trends with unit's faculty: *results of surveys and exit interviews are shared in faculty meetings, and have been used extensively in preparing the SENR semester curriculum; ongoing review of the semester curriculum, particularly during 2012-2014, with continue this process.*

-Analyze and report to college/school: *survey results have been reported to the College and across the university.*

-Make improvements in curricular requirements: *survey and interview results were used extensively to shape the semester curriculum, and will be similarly employed to shape revisions to the semester curriculum in coming years.*

-Make improvements in course content: *information from meetings with students, SEI's, surveys and interviews are all used to improve course content; course revisions and improvements were a particular focus of the curriculum planning process for the Q2S conversion, and will remain a focus particularly during 2012-2014 as the semester curriculum is refined and optimized.*

-Periodically confirm that current curriculum and courses are facilitating student attainment of program goals: *survey results are particularly useful as evidence of success in this area.*

Curriculum Outcomes Map
for B.S. Degree in Environment and Natural Resources
Core Requirements common to all Specializations

1 2 3 4 5 6 7 8 9 10

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ES Curriculum Maps

		Semester																		
		Hrs																		
University Requirements (GE courses)		61																		
Writing Level 1	3	English 110, English composition		I																
Writing Level 2	3	ENR 367, Communicating Env. and Nat. Res.Info.		A			A	I												
Literature	3			I																
Arts and Humanities	3			I																
Data Analysis	3	ENR 222, Stat 145, H&CS 260,or Ansi 260		R																
Math 1	5	Math 1156, Calculus for the Biological Sciences		I																
Biological Science 1	4	Biol 113 + Lab		I																
Biological Science 1	4	Biol 114 + Lab		I																
Physical Science 1	4	General Chemistry (121/122) + Lab		I																
Physical Science 2	4	General Chemistry (122/123) + Lab		I																
Physical Science 3	4	Organic Chemistry, Chem 231		I																
Historical Study	3				I															
Social Science 1	3	Rural Soc 1500				I	I	I	I	I									A	
Social Science 2	3	AEDE Econ 200				I			I											
Culture & Ideas or Historical or Social	3				I															
Open Option	5	Physics 111 equivalent		I																I
Option Option	4	Earth Science 121, Introduction to Physical Geology		I		I														
ENR Core Requirements		25																		
ENR 201 / 2100	4	Introduction to Environmental Science		R			I	I	I	R	R	R	I							
ENR 300.01 / 3000	3	Introduction to Soil Science		R			R	I	R	R	R	R	I							
ENR 319 / 3300	3	Introduction to Forestry, Fish, and Wildlife		R																
ENR 3400	3	Social Science: Individual or Community Level			R				R											
ENR 3700	2	Introduction to Spatial Info. For Natural Resources							R											
ENR 606.01 / 4900.01	3	Capstone course in Natural Resource Management					A	A	A											
ENR 203	3	Society and Natural Resources					I													
ENR 400	4	Natural Resources Policy					I													
Environmental Science Major		8																		
ENR 300.02 /3001	1	Soil Science Laboratory		A					A	A	A	A	I							
ENR 119.03 / 1000.03	1	Survey of Environmental Science									I									
ENR 355.01 /3280	2	Water Quality Management		A			I	I	I				I							
EEOB 503.01	3	Introduction to Ecology					I	I	I	I	I									
EEOB 503.02	1	Ecology Laboratory					I	I	I	I										

- 1 Strong foundation of knowledge in mathematics and science
- 2 Ability to communicate effectively (oral and written)
- 3 An understanding of Natural Resource policy
- 4 Scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world
- 5 Knowledge and skills to understand and solve environmental science issues
- 6 Knowledge of contemporary environmental science issues
- 7 Competitive preparation for professional career-track employment in Soil Science, Water Resources, Ecosystem, or related field
- 8 Academic foundation to pursue graduate studies in Soil Science, Water Resources, Ecosystem Restoration or related field
- 9 Maintain disciplinary depth by ensuring educational requirements for professional certification are met
- 10 Knowledge, concepts of water, air, and climate/ atmospheric science

RATINGS
Introduced (I): Early introduction of topic/skill
Reinforced (R): Advanced coverage of topic/use of skills building on earlier introductions
Applied (A): Application of knowledge/skills to real-world problems/experiences

Curriculum Outcomes Map
Environmental Science B.S. Degree
Ecosystem Restoration Option

				1	2	3	4	5	6
ENR 756 / 5560	3	2	Restoration of Ecosystems						
Ecosystem Science (select 2)		8 to 10	7 to 8						
ENR 656 / 5220	3	2	Ecosystems of the World	I					
ENR 322 / 3323	5	3	Forest Ecosystems	A		A			
ENR 442 / 4260	5	3	Soil Management	A	I	A		A	
ENR 622 / 5522	5	3	Stream Ecology	A			A		
ENR 675 / 5273	4	3	Env Fate of Contaminants in Soil & Waters	A	I			I	I
ENR 725 / 5250.01 and 5250.02	5	5	Wetland Ecology & Management	A		A	A		
Ecosystem Restoration (select 2)		6 to 8	5 to 6						
ENR 618 / 5222	4	3	Ecological Engineering Science	R	R		A		
ENR 731 / 7310	3	2	Forest Ecosystem Restoration	R	R		A		A
ENR 770 / 7700	4	3	Watershed Ecology & Restoration	R	R	R			A
ENR 5279		3	Urban Soil Assessment and Restoration	R	R		A		A
				R	R			R	A
					R				A
Methods (select one)		3 to 5	3 to 4						
ENR 626 / 5345	5	4	Methods in Aquatic Ecology	R			R		A
ENR 662 / 5362	5	3	Wildlife Ecology Methods	R					A
ENR 720 / 5265	3	3	Characterization of Soil in the Field and Laboratory: Sampling						
ENR 740 / 5266	3 (4)*	3	Field Soil Investigation of Soil Chemistry, Fertility, and Biology						
ENR 760 / 5225	5	3	Ecosystem Modeling	R		R	R	R	A
Directed Electives		9 to 15	9 to 12						
		35	29						

- 1 Scientific principles, concepts of ecosystem processes in terrestrial and aquatic systems
- 2 Knowledge of contemporary ecological restoration issues
- 3 Scientific principles, concepts of ecological restoration of forest ecosystems
- 4 Scientific principles, concepts of ecological restoration of wetland and river ecosystems
- 5 Scientific principles, concepts of ecological restoration of soil ecosystems
- 6 Application of field methods to assess ecological restoration (technology performance measures)

Advanced Topics in Mineralogy and Crystallography

RATINGS

Introduced (I): Early introduction of topic/skill **Elem. Chem. Analysis using ICPOE and Mass Spec.**

Reinforced (R): Advanced coverage of topic/use of skills building on earlier introductions

Applied (A): Application of knowledge/skills to real-world problems/experiences

Curriculum Outcomes Map
Environmental Science B.S. Degree
Environmental Science Education Option

1 2 3 4 5 6
|

	Qtr Hrs	Semester equiv.			
Science Education (select one)					
ENR 311 / 3611	3 to 5	2	Environmental Interpretation & Education	I	
ENR 410 / 4611		3	Visitor Services	A	
Ecosystem Science (select one course from each sub-category)					
Soils (select one)					
ENR 660 / 5262	5	4	Soil Chemical Processes & Env Quality	R	R
ENR 675 / 5273	4	3	Environ Fate & Impacts of Contaminants	R	R
Wetlands and Aquatics (select one)					
ENR 620 / 5342		3	Principles of Fisheries Ecology & Mgt	R	R
ENR 622 / 5362		3	Stream Ecology	R	R
ENR 725 / 5250.01 and 5250.02		5	Wetland Ecology & Restoration	R	R
Forests and Wildlife (select one)					
ENR 623 / 5360		4	Principles of Wildlife Ecology & Mgt		R R
ENR 734 / 5340		3	Forest Ecosystem Management		R R
Methods for Ecosystem Restoration (select one)					
ENR 618 / 5222	4 to 5	3 to 4	Ecological Engineering & Science		A
ENR 662 / 5562	5	3	Wildlife Ecology Methods		A
ENR 626 / 5345	5	4	Methods in Aquatic Ecology		A
ENR 770 / 7700	5	3	Watershed Ecology & Restoration		A
Science Certification					
Directed Electives	11 to 15	9 to 15			R A
		35	29		

- 1 Knowledge and Methods in Environmental Science Education
- 2 Scientific principles and concepts of Soils and their Processes
- 3 Scientific principles and concepts of Wetlands and Aquatic Ecosystems
- 4 Scientific principles and concepts of Wildlife and Forest ecosystems
- 5 Understanding of ecological restoration methods and policies
- 6 Competencies for State Science Education certifications

RATINGS

Introduced (I): Early introduction of topic/skill

Reinforced (R): Advanced coverage of topic/use of skills building on earlier introductions

Applied (A): Application of knowledge/skills to real-world problems/experiences

Curriculum Outcomes Map
Environmental Science B.S. Degree
Water Science Option

1 2 3 4 5 6 7
|

	Qtr Hrs	Semester equiv.						
Water Science Required Courses				17	15			
ENR 622 / 5362	5	4	Stream Ecology		I	I	I	I
ENR 725 / 5250.01 and 5250.02	5	5	Wetland Ecology & Restoration		I	I	I	I
AGSYSMGM 370	3	3	Principles of Hydrology		I			
ENR 675 / 5273	4	3	Env Fate of Contaminants in Soil & Waters	A	A	A	A	A
Water Resource Courses (select 2)				7 to 10	6 to 7			
EEOB 652/655	5	4	Limnology		I	I	I	R
ENVENG 613	4	3	Applied Hydrology		R	A	A	
EARTHSCI 206/2206	5	3	Principles of Oceanography		I	A	A	
ENR 627 / 5350.01	3	3	Taxonomy and Behavior of Aq. Inverts		A	A	A	A
Management and Restoration Courses (select 1)				3 to 5	2 to 3			
ENR 628 / 5355	5	3	Aquaculture		A	A	A	
ENR 620 / 5342	5	3	Fisheries Ecology and Management		A	A	A	A
ENR 618 / 5222	4	3	Ecological Engineering Science		R	A	A	R
ENR 770 / 7700	4	3	Watershed Ecology & Restoration		R	A	A	R
ENR 756 / 5560	3	2	Restoration of Ecosystems			A	A	R
Methods (select 1)				3 to 5	3 to 4			
ENR 626 / 5345	5	4	Methods in Aquatic Ecology		R	R		R
ENVENG 610	3	3	Analysis of Natural and Polluted Waters		A	R		R
ENR 760 / 5225	5	3	Ecosystem Modeling		A	R	R	R
Directed Electives				0 to 5	0 to 3			
				35	29			

- 1 Scientific principles, concepts of ecosystem processes in water science and aquatic systems
- 2 Knowledge of aquatic ecosystem (wetlands, streams, and rivers) structure and function
- 3 Application of aquatic ecosystem (wetlands, streams, and rivers) bases to management and ecological engineering
- 4 Scientific principles, concepts of ecological restoration of wetland ecosystems
- 5 Scientific principles, concepts of ecological restoration of stream and river ecosystems
- 6 Scientific principles, concepts of ecological restoration of lacustrine and coastal ecosystems
- 7 Ability to design and conduct experiments, as well as analyze and interpret data

RATINGS

Introduced (I): Early introduction of topic/skill

Reinforced (R): Advanced coverage of topic/use of skills building on earlier introductions

Applied (A): Application of knowledge/skills to real-world problems/experiences

Curriculum Outcomes Map

B.S. Degree in Environment and Natural Resources

Environmental Molecular Sciences Option

1 2 3 4 5

	Qtr	Semester					
	Hrs	Equiv.					
Biological Science				8 to 10	4 to 7		
Required (select 1)	3 to 5	2 to 3					
MICROBIOL 509	5	3	Basic & Practical Microbiology			I	I I I I
MICROBIOL 520	5	3	Microbiology I			I	I I I I I
PCMB 630	3	2	Plant Physiology I			I	I I I I
Electives (select 1)	3 to 5	2 to 4					
MICROBIOL 521	5	3	Microbiology II			R	R R R R R
MICROBIOL 665	3	2	Environmental Microbiology			R	R R R R R
MICROBIOL H669	5	3	Microbial Evolution			R	
MICROBIOL H610	5	3	Bioinformatics & Molecular Microbiology				
PCMB 625	3	2	Plant Metabolic Engineering				A R A
PCMB 631	3	2	Plant Physiology II				R R
PLNTPH 401	5	4	General Plant Pathology				R R
PLNTPH 600	6	4	Intro to Bacterial and Viral Pathogens of Plants				I I
PLNTPH 602	3	2	Plant-Microbe Interaction				R R
PLNTPH 660	5	3	Mycology				R R R
Environmental Science				8 to 10	6 to 8		
Required (select 1)	5	4					
ENR 660 / 5262	5	4	Soil Chemical Processes & Environmental Quality			I	I I I
Electives (select 1)	3 to 5						
ENR 665 / 5263	4	3	Biology of Soil Ecosystems			R	R R R
ENR 675 / 5273	3	3	Env Fate & Impact of Contaminants in Soil & Water			R	R R R
ENR 753 / 7530	5	4	Soil and Environmental Mineralogy			R	R R R
ENR 761 / 6610	4	2	Soil and Environmental Biochemistry			R	R R R
Geochemistry & Mineralogy				7 to 10	5 to 6		
Required (select 1)	5	3					
EARTHSCI 421/4421	5	3	Introductory Mineralogy and Crystallography			I	I I
EARTHSCI 621/5621	5	3	Principles of Geochemistry			I	I I
Electives (select 1)	2 to 5						
EARTHSCI 628/5628	3		Environmental Isotope Geochemistry				
EARTHSCI 636/5636	3		Advanced Topics in Mineralogy and Crystallography				
EARTHSCI 651/5651	4		Hydrogeology			R	R R R
EARTHSCI 674/5676	3		Elem. Chem. Analysis using ICPOE & Mass Spec.			A	A A A A
EARTHSCI 680/5680	3		Scanning Electron Microscopy/Deep Earth Geophys			A	A A A A
Molecular Biology (select 2 7 to 10)				5 to 8			
Required (select 1)	4 to 5	3 to 4					
BIOCHEM 511	5		Introduction to Biological Chemistry			I	I I I I I
BIOCHEM 613	4		Biochemistry & Molecular Biology I			I	I I
MG 500	5		Molecular Genetics			I	R I R
PCMB 622	4		Plant Molecular Biology			I	R I R
Electives (select 1)	3 to 5	2 to 4					
BIOCHEM 614	4		Biochemistry & Molecular Biology II				R R
MICROBIOL 581	5		Microbial Genetics			R	R R R
MG 605	4		Molecular Genetics			R	R R R
MG 606	4		Molecular Genetics			R	R R R
MG 607	3		Cell Biology			R	R R R R
MG 622	5		Plant Genetics & Molecular Biology			R	R R R R
PCMB 623	4		Plant Genetics and Genomics			R	R R R R
PCMB 648	5		Plant Cell Biology			R	R R R R
PCMB 650	3		Biological Microtechnique			A	A A A
Directed Electives		0 to 7					

35 29

- 1 Scientific principles, concepts of biogeochemical processes in aquatic and terrestrial ecosystems
- 2 Knowledge of contemporary biogeochemical processes
- 3 Knowledge of engineered plants and microbes
- 4 Scientific principles, concepts of biogeochemical remediation of aquatic and terrestrial ecosystems
- 5 Scientific principles, concepts of technology for biofuel-generating plants and microbes

RATINGS

Introduced (I): Early introduction of topic/skill

Reinforced (R): Advanced coverage of topic/use of skills building on earlier introductions

Applied (A): Application of knowledge/skills to real-world problems/experiences

Curricular Outcomes Map
B.S. Degree in Environment and Natural Resources
Soil Resources and Environmental Sustainability Option

1 2 3 4 5 6 7 8 9 10 11 12

	Qtr Hrs	Semester equiv.										
ENR 655/671 (Environmental Soil Physics) / 5261	5-Apr	3	R	R	R			A	A	A	A	
AGSYSMGT 370 (Soil & Water Principles of Hydrology)	3	3 to 4									A	
or ENR 770 (Watershed Ecology & Restoration)	5									R	R	
or Earth Sciences 550/5550 (Geomorphology)	5										R	
ENR 650 (Soil Landscapes: Morphology, Genesis & Classification) / 5260	5	3	R	R	R	R	A	A	A	A	I	A
ENR 660 (Soil Chemical Processes & Environmental Quality)/ 5262	5	4	R	R		R						
ENR 665 (Biology of Soil Ecosystems)/5263	4	3				R	R	R	R	A	A	
ENR 580 (Soil Fertility) / 5270	3	3	A	A	A	A	A	A	R	A	A	
or ENR 442 (Soil Management) / 4260	5	3	A	A	A	A	A	R	A	A	A	
Directed Electives	6-11	1 to 10										
Civil Engineering 610: Analysis of Natural and Polluted Waters	3											
Civil Engineering 722: Open Channel Hydraulics	4											
Civil Engineering 610: Analysis if Natural and Polluted Waters	3											
Civil Engineering 613: Applied Hydrology	4											
Earth Sciences 651: Hydrogeology /5651	5	4										
ENR 622 Stream Ecology / 5362	5	4										
ENR 725 (Wetland Ecology and Management) / 5250.01 and 5250.02	5	5										
ENR 601: Environmental Impact Assessment / 5210	4	3										
ENR 602: International Environmental Impact Assessment / 5211	5	3										
ENR 626: Methods in Aquatic Ecology / 5345	5	4										
ENR 630: Forest Soils / 5271	3	3										
ENR 651: Water Resources Institutions and Policies/ 6451	5	3										
ENR 675: Env Fate & Impact of Contam in Soils & Natural Waters / 5273	4	3										
ENR 720: Characterization of Soil in the Field and Lab: Sampling / 5265	3	3										
ENR 730: Computer Simulation of Soil Processes /5274	3	2										
ENR 740: Field Soil Invest of Soil Chemistry, Fertility, and Biology / 5266	3	3										
ENR 753: Soil Mineralogy / 7530	5	4										
ENR 756: Rehabilitation/Restoration of Ecosystems / 5560	3	2										
ENR 760: Soil and Environmental Biochemistry / 6610	4	4										
Option Total	24-29	29										

OUTCOMES

- 1 Appreciate the value of soils in providing critical ecosystem services
- 2 Understand the diversity and genesis of soils in time and space
- 3 Understand description of soil morphology in the field, soil classification, soil mapping, and land evaluation
- 4 Understand soil physical properties and processes, particularly the physics of soil water, air and energy
- 5 Understand soil chemical constituents, and biogeochemical processes
- 6 Understand the mineralogy of soil constituents, particularly clay minerals
- 7 Understand the biology of soil organisms, and soil microbial ecology
- 8 Understand soil fertility, the role of soil organic matter, the carbon cycle and carbon sequestration in soils
- 9 Understand the causes & effects soil erosion and land degradation, and sustainable land & watershed mgmt practices
- 10 Understand the effects of soil pollutants, the land application of waste products and soil restoration techniques
- 11 Understand the diversity of soils in wetlands, forests, urban areas, the tropics and polar regions
- 12 Understand the hydrologic cycle and soil/water relationships at the profile, hillslope and watershed scales

RATINGS

Introduced (I): Early introduction of topic/skill

Reinforced (R): Advanced coverage of topic/use of skills building on earlier introductions

Applied (A): Application of knowledge/skills to real-world problems/experiences

Responses to

Working Group Two Questions for June 1 subcommittee meeting

Below are responses regarding Q2S proposals for the SENR major:

ES-BS

(FFW-BS, EPDM-BS, and NRM-BS not included here)

Many of the questions below have been clarified/resolved by the attached revised Semester Advising Sheets for each major, including detailed advising sheets for each specialization in each major (specialization sheets were missing from the previous submission). Four-year transition plans for each major have also been added for each major, attached. These and all other responses and revisions are detailed below.

Questions about any of the following can be directed to Greg Hitzhusen (hitzhusen.3@osu.edu).

Environmental Science—BS

1. *Can you provide a rationale for why this major does not require a minor, since that seems to be a general guideline for FAES major programs? SENR students are not required to complete a minor. SENR has never adopted the College's requirement of a minor.*
2. *The choices on the GE advising sheet seem a bit unclear. Do students choose between Rural Soc and Soc? Or Rural Soc and any GE in that category? We have typically recommended the Rural Soc course, but students can take any GE course in that category, as per standard GE practice.*
3. *Can you provide 4 year transition plans that show what the program would be like for students who enter during quarters and exit under semesters? Attached.*
4. *Again, all of the tables beginning on page 10 are difficult to read due to formatting, can you rectify this? Perhaps if you use the same type of chart that appears beginning on page 31, it would work better. This refers to the semester advising sheets. These have been reformatted in the attached.*
5. *On page 10, the hours assigned for the various specializations are listed as 25, but then all the options seems to require 27 (subsequent pages). Likewise, it conflicts with the other advising sheet – (p. 7) where the “specialization” hours are different. Can you clarify this information for us? These semester advising sheets have been revised in the attached, and reflect 27 credits in all instances.*
6. *With regards to the Environmental Sciences Education option – are any pedagogy classes required? Has concurrence from EHE been sought? What about other new specialization – has proper concurrence been sought? No pedagogy classes are required; concurrence has not been sought from EHE. This specialization does not intend to*

provide certification at the undergraduate level, but to provide a robust environmental science background and foundation for students intending to complete a graduate education program for their certification. No pedagogy classes are required, though the environmental education classes included give students exposure to working with youth in environmental education and interpretation. As for other concurrence for Environmental Molecular Science, this specialization is simply formalizing what some students in the major have already been focusing on at the micro level, and we have not sought any concurrence for this.

7. *The education option recommends a MEd post grad, have you had conversations with EHE about this, as the MEd option will be maintained, but most students will pursue licensure at the undergraduate level.* We have not had conversations with EHE about this; we are not pursuing certification at the undergraduate level, but providing a robust foundation of environmental science content to move on and pursue certification in a master's program. Some of our Environmental Science students already follow this route, and this specialization is shaped more particularly towards those interests.
8. *What happens to students in the current specializations?* Students in the current specializations will either finish their degree with those specializations, or may change to one of the new specializations if they choose.

Responses to additional subcommittee questions:

Environmental Science BS

1. Some of the numbers on page 4 and 5 of the semester advising sheets do not seem to add up correctly. If you look at the charts below (**not included here**), can you explain why it lists 4 credit hours under “required” in the first table, and 3 under “required” in the second table? It seems that those numbers are a typo and should be removed. Can you confirm that? **Yes, the “4” is a typo and should have been a “3”. This has been corrected in the advising sheets above.**
2. Also, many of the specializations starting on page 4 are missing credit hours. Can you fill in that information? **We have filled in as much of that information as we have access to. We have yet to receive any semester course numbers or other course information for EEOB semester courses. As with all of our program/advising sheets, any remaining course details will have to be finalized once all relevant semester courses have been approved in final form (number of credits, title of course, etc).**