University Senate
TRANSMITTAL FORM

Senate Document #:	12-13-28
PCC ID #:	12014
Title:	Proposal to Merge the Environmental Science and Policy Bachelor Degree Program's Areas of Concentration in Earth Surface Processes and Environmental Restoration and Management into One New Area of Concentration in Environmental Geosciences and Restoration
Presenter:	William Idsardi, Chair, Senate Programs, Curricula, and Courses Committee
Date of SEC Review:	November 12, 2012
Date of Senate Review:	December 5, 2012
Voting (highlight one):	1. On resolutions or recommendations one by one, or 2. In a single vote 3. To endorse entire report
Statement of Issue:	The Environmental Science and Policy (ENSP) program and the Department of Geology wish to merge the Environmental Science and Policy bachelor degree program's areas of concentration in Earth Surface Processes and Environmental Restoration and Management into one new area of concentration in Environmental Geosciences and Restoration. The current area of concentration in Earth Surface Processes has had low enrollment and its curricular content overlaps significantly with the Geology major. The current Environmental Restoration and Management area of concentration has lost its advising support and is also in need of curricular revision. The ENSP program and Department of Geology believe that the best way to improve the ENSP program's academic options is to combine these two areas of concentration into a new concentration that will integrate earth and life sciences to a much greater degree than any current ENSP concentration. The new area of concentration in Environmental Geosciences and Restoration reflects the national trend toward environmental geosciences and biogeochemistry, and takes advantage of the Department of Geology's growing research community in environmental geosciences. Students who are

	currently enrolled in either Earth Surface Processes or Environmental Restoration and Management will be allowed to finish their concentrations with their current curricular requirements. The Maryland Higher Education Commission (MHEC) requires universities and colleges operating in the state to submit formal proposals to modify their listings of approved academic degree programs and formal areas of concentration. To accomplish the merger of these two formal areas of concentration, this proposal will be submitted to MHEC as a request to substantially modify and rename the Earth Surface Processes area of concentration as Environmental Geosciences and Restoration and formally retire the area of concentration in Environmental Restoration and Management. The Academic Planning Advisory Committee approved the proposal on October 8, 2012. The Senate PCC committee approved the proposal at its meeting on November 2, 2012.
Relevant Policy # & URL:	Not Applicable
Recommendation:	The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve the merger of these two areas of concentration into a new area of concentration.
Committee Work:	The Committee considered the proposal at its meeting on November 2, 2012. Wendy Whittemore, Associate Director of the Environmental Science and Policy program, and John Merck, Director of Undergraduate Studies for the Department of Geology, presented the proposal and responded to questions. After discussion, the Committee voted unanimously to recommend the proposal.
Alternatives:	The Senate could decline to approve the proposed area of concentration.
Risks:	If the Senate does not approve the proposed Area of Concentration, the Environmental Science and Policy program will lose an opportunity to streamline and strengthen its academic options.
Financial Implications:	There are no significant financial implications with this proposal.
Further Approvals Required: *(*Important for PCC Items)*	If the Senate approves this proposal, it would still require further approval by the President, the Chancellor, and the Maryland Higher Education Commission.

THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM/UNIT PROPOSAL

- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.
- Please submit the signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.

PCC LOG NO. 12014

College/School: ___ Computer, Mathematical, and Natural Sciences (CMNS) ___
Please also add College/School Unit Code-First 8 digits: **01203000**

Unit Codes can be found at: https://hypprod.umd.edu/Html_Reports/units.htm

Department/Program: ___Geology (GEOL) __ and__Environmental Science and Policy Program (ENSP)___
Please also add Department/Program Unit Code-Last 7 digits: **1301101**

Type of Action (choose one):

- ☐ Curriculum change (including informal specializations)
- ☐ *Renaming of program or formal Area of Concentration*
- ☐ *Addition/deletion of formal Area of Concentration*
- ☐ *Suspend/delete program*
- ☐ *New academic degree/award program*
- ☐ New Professional Studies award iteration
- ☐ New Minor
- **X Other**

Italics indicate that the proposed program action must be presented to the full University Senate for consideration.

Summary of Proposed Action: This proposal represents a significant update and improvement in two areas of concentration in Environmental Science and Policy: Earth Surface Processes and Environmental Restoration and Management. The resulting, new concentration, called Environmental Geosciences and Restoration:

- Integrates earth and life sciences to a much greater degree than any current ENSP concentration.
- Avoids overlap with the present Geology and ENST majors while offering an interesting and challenging alternative to them.
- Reflects the national trend toward the increasing prominence of environmental geosciences and biogeochemistry.
- Links the emerging discipline of environmental restoration with supporting core sciences and prepares students for graduate programs and employment.
- Takes advantage of Geology's growing research community in environmental geosciences and creates opportunities for future synergy with other units in the newly-established College of Computer, Mathematical, and Natural Sciences.

Upon approval of this curriculum, we will discontinue both predecessors (Earth Surface Processes and Environmental Restoration & Management) and allow currently-enrolled students to graduate. The new concentration will be sponsored by the Department of Geology. No additional resources are anticipated.

APPROVAL SIGNATURES - *Please print name, sign, and date. Use additional lines for multi-unit programs.*

GEOL
1. Department Committee Chair, Bruce R. James — 9/21/12 - JOHN MERIC
ENSP 1. Department Committee Chair, Bruce R. James — 6-27-12
GEOL 2. Department Chair Bruce R. James — 9/21/12
ENSP 2. Department Chair Bruce R. James — 6-27-12
3. College/School PCC Chair — 9.26.2012
4. Dean — 9/26/12
5. Dean of the Graduate School (if required) ____
6. Chair, Senate PCC — 11/2/12
7. University Senate Chair (if required) ____
8. Senior Vice President and Provost ____

Environmental Science and Policy

ENVIRONMENTAL GEOSCIENCES AND RESTORATION

Proposed New/Merged Concentration

Background

The proposed ENSP concentration in Environmental Geosciences and Restoration is intended to capitalize on growing university strengths while addressing long-standing infelicities of the existing concentration in Earth Surface Processes (ESP) and changes in departmental support for the existing concentration in Environmental Restoration and Management (ERM).

ESP was conceived as a means of equipping students to pursue careers in environmental geosciences. While it has achieved this goal, graduating high-quality majors, enrollment in it has historically been low, generally with fewer than ten students at any one time. In part for this reason, it has not been formally updated in over ten years – almost since its inception 15 years ago, despite there having been important changes in the Chemistry and Geology curricula that necessitated frequent case-by-case adjustments to individual plans. Moreover, ESP requirements overlap sufficiently with Geology that one might regard it as resembling an environmental geosciences track of Geology as much as a unique academic program.

Adding urgency to these issues, it has recently become known that changes in the professional priorities of the advisor of the Environmental Restoration and Management (ERM) concentration will require him to withdraw from an active role in ENSP and focus instead on the recently-established major in Environmental Science and Technology (ENST), where he is a faculty member.

Finally, in recent years the hiring of Geology faculty specializing in environmental geosciences has greatly increased the range of relevant upper-level courses in this area.

In response to these issues, the Environmental Science and Policy Program and Department of Geology propose that the ESP and ERM concentrations be phased out and replaced with a concentration - Environmental Geosciences and Restoration – that will incorporate current upper-level Geology, ENST, and Biology courses into a unique curriculum in environmental geosciences. This proposal reflects both changes to our curriculum and improvements in the academic preparedness of students entering the University in the last 10 years, which lends itself to the development of more challenging curricular possibilities.

Objectives

This proposed concentration represents a significant revision and improvement in environmental geosciences and their practical applications. The new concentration, called Environmental Geosciences and Restoration:

- Integrates earth and life sciences to a much greater degree than any current ENSP concentration.
- Avoids overlap with the present Geology and ENST majors while offering an interesting, challenging, and academically distinct alternative to them.
- Provides a coherent primary curriculum that allows a reasonable degree of specialization in an area or areas of depth.
- Reflects the national trend toward the increasing prominence of environmental geosciences and biogeochemistry.
- Links the emerging discipline of environmental restoration with supporting core sciences and prepares students for graduate programs and employment.
- Takes advantage of Geology's growing research community in environmental geosciences and creates opportunities for future synergy with other units in the newly-established College of Computer, Mathematical, and Natural Sciences.

Upon approval of this curriculum, we will discontinue both predecessors (Earth Surface Processes and Environmental Restoration & Management) and allow currently-enrolled students to graduate.

TOTAL CREDITS REQUIRED FOR THE B.S., including the new General Education Program = 120 credits including: **83** credits in the major; **21-27** credits for General Education courses; and **10-16** elective credits.

Required Fundamental Courses and Background (39 credits).

Course	Title	Cr
All three:		
ENSP 101	Intro. to Environmental Science	3
ENSP 102	Intro. to Environmental Policy	3
ENSP 400	Capstone in Env. Sci & Policy	3
Calculus:		
MATH 140	Calculus I	4
Statistics (one):		
BIOM 301	Introduction to Biometrics	3
GEOG306	Quant. Methods in Geog. Env. Sci.	3
STAT 400	Applied Prob and Statistics I	3
Chemistry (one):		
CHEM 131/132 *or*	General Chemistry I	3/1
CHEM 135/136	Chemistry for Engineers	3/1
Earth Sciences:		
ENST 200 *and*	Fundamentals of Soil Science *and*	4
GEOL120/110 *or*	Environmental Geology/Lab *or*	3/1
GEOL100/110	Physical Geology/Lab	3/1

Biology:		
BSCI 106	Principles of Biology II	4
Govt & Politics (one):		
AREC 332	Intro. to Natural Resource Policy	3
ENSP 330	Intro. to Environmental Law	3
ENSP 340	Sci., Ethics, and Law of Water	3
GVPT 273	Intro. to Environmental Politics	3
Economics (one):		
AREC 240	Intro. to Economics and the Envir	4
ECON 200	Principles of Micro-Economics	4

Basic Sciences (12 credits)

Course	Title	Cr
CHEM 231/232	Organic Chemistry I and Lab	4
MATH141	Calculus II	4
PHYS141 *or*	Principles of Physics *or*	4
PHYS161/PHYS174	Gen Physics: Mech and Part Dyn & Lab	3/1

Upper Level Requirements (17 credits)

Course	Title	Cr
BSCI 361	Principles of Ecology	4
GEOL 340	Geomorphology	4
GEOL451 *or*	Groundwater *or*	3
GEOL452	Watershed and Wetland Hydrology	3
GEOL453	Princ and Prac of Ecosystem Restoration	3
ENSP 386	Internship	3

Areas of Depth (15 credits) – including at least 5 classes *and* [a minimum of 6 credits from each of two areas] *or* [a minimum of 9 credits in one area]

Course	Title	Cr
Techniques and Application:		
GEOG372	Remote Sensing	3
GEOG373	Geographic Info Systems	3
Environmental Restoration:		
ENST 414	Soil Morph Genesis and Classif.	4
ENST 421	Soil Chemistry	4
ENST 422	Soil Biochem & Microbial Ecol.	3
ENST 423	Soil-Water Pollution	3
ENST 430	Wetland Soils	3
ENST 450	Wetland Ecology	3
ENST452	Wetland Creation and Restoration	3
PLSC471	Forest Ecology	3
Surficial Geology:		

GEOL 322	Mineralogy	4
GEOL 342	Sedimentation and Stratigraphy	4
GEOL 436	Biogeochemistry	3
GEOL 437	Global Climate Change Past/Pres.	3
GEOL 444	Low-Temperature Geochemistry	4
GEOL451*	Groundwater*	
GEOL452*	Watershed and Wetland Hydrology*	3
* If not taken to satisfy upper level requirement above		3

Deep-Earth Geology:

GEOL102	Historical Geology	4
GEOL341	Structural Geology	4
GEOL423	Optical Mineralogy	3
GEOL443	Petrology	4
GEOL445	High-Temperature Geochemistry	4
GEOL446	Geophysics	3
GEOL455	Marine Geophysics	3
GEOL456	Engineering Geology	3
GEOL457	Seismology	3

ENVIRONMENTAL GEOSCIENCES AND RESTORATION

Proposed "effective date" – January 2013

Reviewed: 05.22.12

UM Core (24-27 cr) ENGL 101_____, HL_____, HA _____, HL/HA/HO/IE _____, SH _____, Diversity _____
Adv Writing _____, Adv. Studies_____, SB_____, SB/IE_____..

New GenEd (27-30 cr) Acad Writing: _____, FS Oral Comm _____ I-Series 1_____ I-Series 2 _____ HU1_____ HU 2_____ Div 1_____ Div 2_____
Prof Writing: _____, Schol in Prac (non-major) _____

Grading Policy: Environmental Science and Policy students must earn a C- grade or higher in all ENSP core courses and in all required courses and restricted electives of the selected area of concentration.

ENSP Core (39 credits)

Course	Title	Cr	Offered	Prerequisites	Grade	CORE	GenEd
All three:							
ENSP 101	Intro. to Environmental Science	3	F	-	_____	(PS)	NS 1
ENSP 102	Intro. to Environmental Policy	3	Sp	-	_____		HS 1
ENSP 400	Capstone in Env. Sci & Policy	3	Sp, F	Senior year; ENSP 101 and 102	_____	(AS)	SP (major)
Calculus:							
MATH 140	Calculus I	4	Sp, F, Su	dept. perm. or MATH 115 w/C or better	_____	(MS)	MA
Statistics (one):							
BIOM 301	Introduction to Biometrics	3	Sp, F	MATH 115	_____		AR
GEOG306	Quant. Methods in Geog. Env. Sci.	3	Sp, F, Su		_____		
STAT 400	Applied Prob and Statistics I	3	Sp, F, Su	MATH 141	_____		
Chemistry (one):							
CHEM 131/132 *or*	General Chemistry I	3/1	Sp, F, Su	placement in MATH 111 or higher	_____	(PL)	NL2
CHEM 135/136	Chemistry for Engineers	3/1	Sp, F	coreq: MATH 115	_____		
Earth Sciences:							
ENST 200 *and*	Fundamentals of Soil Science *and*	4	Sp	CHEM 131/132 or dept. perm.	_____	(LL)	NL2
GEOL120/110 *or*	Environmental Geology/Lab *or*	3/1	Sp, F, Su	-	_____	(PL)	NL2
GEOL100/110	Physical Geology/Lab	3/1	Sp, F, Su				
Biology:							
BSCI 106	Principles of Biology II	4	Sp, F, Su	placement in MATH 110 or higher	_____	(LL)	NL2

Choose one course from each category below:

Govt & Politics (one):							
AREC 332	Intro. to Natural Resource Policy	3	Sp	AREC 240 or ECON 200. Offered in "odd" years, e.g., 2011, 2013 etc.	_____		
ENSP 330	Intro. to Environmental Law	3	F	Permission of dept; Junior standing.	_____		
ENSP 340	Sci., Ethics, and Law of Water	3	varies	Permission of dept; Junior standing.	_____		
GVPT 273	Intro. to Environmental Politics	3	Sp, F	GVPT 170 or ENSP 102	_____		
Economics (one):							
AREC 240	Intro. to Economics and the Envir	4	Sp, F	MATH 220 or higher recommended	_____	(SB)	HS 2
ECON 200	Principles of Micro-Economics	4	Sp, F, Su	MATH 110 or higher	_____	(SB)	HS 2
Geography:							
Removed							

ENVIRONMENTAL GEOSCIENCES – Requirements

BASIC SCIENCES (12 credits)

Course	Description	Cr	Offered	Prerequisites	Grade	Comments/subs
CHEM 231/232	Organic Chemistry I	4	Sp,F,Su	CHEM 131/132		
MATH141	Calculus II	4	Sp,F,Su	MATH140		
PHYS141 *or*	Principles of Physics	4		MATH141		
PHYS161/PHYS174	Gen Physics: Mech and Part Dyn & Physics laboratory introduction	3/1		MATH141		

UPPER LEVEL REQUIREMENTS (17 credits)

BSCI 361	Principles of Ecology	4	F,W,Sp	BSCI106		
GEOL 340	Geomorphology	4	Sp	GEOL 100/110 or GEOL120/110		
GEOL451 *or*	Groundwater	3	Sp	CHEM 131/132, GEOL100 or GEOL120, GEOL 110		
GEOL452	Watershed and Wetland Hydrology	3	F	Jr. standing		
GEOL453	Princ and Prac of Ecosys Rest	3	Fa	Jr. standing		
ENSP 386	Internship	3	Fa,Sp,Su	Approved internship proposal		

AREAS OF DEPTH - at least 5 classes and 15 credits, including [a minimum of 6 credits from each of two areas] or [a minimum of 9 credits in one area]

Techniques and Application:						
GEOG372	Remote Sensing	3	Sp,W,Su,F		____	
GEOG373	Geographic Info Systems	3	Fa,W,Su		____	
Environmental Restoration:						
ENST 414	Soil Morph Genesis and Classif.	4	F	ENST 200	____	
ENST 421	Soil Chemistry	4	Sp	ENST 200	____	
ENST 422	Soil Biochem & Microbial Ecol.	3	Sp	ENST 200	____	
ENST 423	Soil-Water Pollution	3	F	ENST 200	____	
ENST 430	Wetland Soils	3	Sp	ENST 200	____	
ENST 450	Wetland Ecology	3	F	BIOM301	____	
ENST452	Wetland Creation and Restoration	3	Sp	BSCI106, one of: BSCI362, ENST360, ENST450	____	
PLSC471	Forest Ecology	3	Sp	BSCI106	____	
Surficial Geology:						
GEOL 322	Mineralogy	4	Sp	GEOL100/110 or GEOL120/110, CHEM 131/132	____	
GEOL 342	Sedimentation and Stratigraphy	4	Sp	GEOL 322	____	
GEOL 436	Biogeochemistry	3	F	GEOL 100/110, CHEM 131/132, and MATH 140 or 220		
GEOL 437	Global Climate Change Past/Pres.	3	Sp	CHEM131/132, GEOL100 or GEOL120, MATH115	____	
GEOL 444	Low-Temperature Geochemistry	4	F	GEOL 100/110, GEOL 322, CHEM 131/132, MATH115	____	
GEOL451*	Groundwater*	3	Sp	CHEM 131/132, GEOL100 or GEOL120, GEOL 110		
GEOL452*	Watershed and Wetland Hydrology*	3	F	Jr. standing		
* If not taken to satisfy upper level requirement above						

Deep-Earth Geology:						
GEOL102	Historical Geology	4	Sp	GEOL100 or GEOL120	____	
GEOL341	Structural Geology	4	F	GEOL102	____	
GEOL423	Optical Mineralogy	3	F	GEOL100 or GEOL120, GEOL322, CHEM131/132	____	
GEOL443	Petrology	4	Sp	GEOL100 or GEOL120, GEOL322, GEOL423, CHEM131/132	____	
GEOL445	High-Temperature Geochemistry	4	F	MATH115; GEOL100; GEOL322; CHEM131 and CHEM132	____	
GEOL446	Geophysics	3	F	MATH140, MATH141	____	
GEOL455	Marine Geophysics	3	F	GEOL100 or GEOL120, MATH141, PHYS141 or PHYS161	____	
GEOL456	Engineering Geology	3	Sp	GEOL100 or GEOL120, MATH141, PHYS141 or PHYS161	____	
GEOL457	Seismology	3	Sp	GEOL100 or GEOL120, MATH141		

Environmental Science and Policy: Environmental Geosciences and Restoration (2299C) - Four Year Academic Plan

Year 1	Fall			Spring		
		Credit	Grade		Credit	Grade
Benchmark 1 Requirements	ENSP101 (NS)	3		ENSP102 (HS1)	3	
ENSP101 **or** ENSP102	MATH140 (MA)	4		MATH141	4	
MATH140	GEOL100/110 (NL)	4		ENGL101 (AW)	3	
Two of: ENSP Econ, ENSP Earth Sci Lab, BSCI106, CHEM131/132	BSCI106	4		Diversity 1	3	
				Sch in Prac (non-major) 1	3	
	TOTAL	15		TOTAL	16	
Year2	**Fall**			**Spring**		
Benchmark 2 Requirements	CHEM131/132	4		CHEM231/232	4	
ENSP101 **and** 102	AREC240 (HS2)	4		ENST200	4	
Two: ENSP Core Lab Sciences	Humanities 1	3		Humanities 2	3	
Three of: CHEM231/232, MATH141, PHYS141, declare concentration	I-Series 1	3		BSCI361	4	
	Statistics (AR)	3				
	TOTAL	17		TOTAL	15	
Year3	**Fall**			**Spring**		
	PHYS141	4		GEOL340	4	
	Depth - 1	3		Oral Communications	3	
	Depth - 2	3 to 4		Depth - 3	3 to 4	
	Diversity 2	3		ENSP330 or ENSP340	3	
	FREE ELECTIVE	3		FREE ELECTIVE	3	
	TOTAL	16-17		TOTAL	16-17	
Year 4	**Fall**			**Spring**		
	GEOL452	3		ENSP400 (SP 2)	3	
	GEOL453	3		Depth - 4	3 to 4	
	I-Series-2	3		Depth - 5	3	
	ENSP386	3		Prof Writing (PW)	3	
	FREE ELECTIVE	3		FREE ELECTIVE	3	
	TOTAL	15		TOTAL	15-16	

*All students must complete two Distributive Studies courses that I-series courses; and two Diversity courses, which may also fill a Distributive Studies category.

*** For the list of Restricted Electives, go to: http://www.ensp.umd.edu/EnvGeoSci.html

Environmental Science and Policy: Environmental Geosciences and Restoration (2299C) – Four Year Academic Plan – **CORE**

Year 1 in ENSP

BENCHMARKS:

By the end of Term 2 in ENSP, you must complete:
_____ ENSP101 ***or*** ____ ENSP 102
_____ MATH 220 ***or*** 140

And ***two*** of:
_____ AREC240 ***or*** ____ ECON200
_____ BSCI 106
_____ CHEM 131/132
_____ ENSP Earth Science with lab

Fall _____

Course	Cr	Grade
ENSP101 (PS)	3	
MATH140 (FM/MFR)	4	
GEOL100/110 (PL)	4	
ENGL101 (FE)	3	
UNIV100	1	
Sem credits	**15**	
Total credits	**15**	

Spring _____

Course	Cr	Grade
ENSP102	3	
MATH141	4	
BSCI106 (LL)	4	
Core HA	3	
Elective	1	
Sem credits	**15**	
Total credits	**30**	

Summer _____

Course	Cr	Grade

Winter _____

Course	Cr	Grade
Sem credits		
Total credits		

Year 2 in ENSP

By the end of Term 4, an ENSP major would need to complete:
_____ ENSP101 ***and*** ENSP102
_____ Calculus
_____ **Two** ENSP Core Lab Sciences

And:

Policy students must complete ***all*** of:
_____ AREC240 (if required by the concent.)
_____ Statistics

Wildlife Ecology and Management and prospective Biodiversity and Conservation Biology students must complete ***all*** of:
_____ BSCI207 ***or*** BSCI222
_____ CHEM 231/232
_____ PHYS 121 ***or*** Calculus II

Other Science students must complete ***all*** of:
_____ Calculus II ***or*** req'd Earth Sci
_____ CHEM 231/232 ***or*** req'd Earth Sci
_____ PHYS 121 ***or*** PHYS141 ***or*** req'd Life Sci

Fall _____

Course	Cr	Grade
CHEM131/132	4	
Core HL	3	
Core SH/D	3	
Core SB	3	
Elective	3	
Sem credits	**16**	
Total credits	**46**	

Spring _____

Course	Cr	Grade
CHEM231/232	4	
ENST200	4	
AREC240 (SB)	4	
Core HO/IE	3	
Sem credits	**15**	
Total credits	**61**	

Summer _____

Course	Cr	Grade

Winter _____

Course	Cr	Grade
Sem credits		
Total credits		

Year 3

If you have not already done so, start gaining career-related experience in earnest. Explore:
_____ENSP386 internships
_____Volunteering, esp. if you hold a demanding part-time job
_____Study Abroad

If you are considering post-graduate study, begin talking with:
_____relevant faculty members
_____the campus Pre-Law advisor
_____the National Scholarships Office

Fall _____

Course	Cr	Grade
PHYS141	4	
Depth – 1	3	
Depth – 2	3	
BSCI361	4	
Elective	3	
Sem credits	**17**	
Total credits	**78**	

Spring _____

Course	Cr	Grade
GEOL340	4	
ENSP330 or ENSP340	3	
Depth – 3	3	
Statistics	3	
Elective	3	
Sem credits	**16**	
Total credits	**94**	

Summer _____

Course	Cr	Grade

Winter _____

Course	Cr	Grade
Sem credits		
Total credits		

Year 4

If possible, limit your last semester to 12 credits. Job-hunting is like having another class!

Continue to challenge yourself with 300-, 400- and graduate-level (if eligible) coursework.

Participate in Career Center and activities related to job-hunting and graduate school exploration.

Fall _____

Course	Cr	Grade
GEOL452	3	
GEOL453	3	
ENSP386	3	
Prof Wrtg (FE)	3	
Depth – 4	3	
Sem credits	**15**	
Total credits	**109**	

Spring _____

Course	Cr	Grade
ENSP400 (AS1)	3	
Depth – 5	3	
Adv Studies (AS2)	3	
Elective	3	
Sem credits	**12**	
Total credits	**121**	

Summer _____

Course	Cr	Grade

Winter _____

Course	Cr	Grade
Sem credits		
Total credits		

EARTH SURFACE PROCESSES

Reviewed: 4.7.12

UM Core: ENGL 101_____, (HL)_____, (HA) _____, (HL/HA/HO/IE) _____, (SH) _____, Diversity _____
Adv. Writing _____, Adv. Studies_____, (SB)_____, (SB/IE) _____.

Grading Policy: Environmental Science and Policy students must earn C- grades or higher in all ENSP core courses and in all required courses and restricted electives of the selected area of concentration.

Required from ENSP Core:

Course	Title	Cr	Offered	Prerequisites	Grade	Completed	Notes
All three:							
ENSP 101 (PS)	Intro. to Environmental Science	3	F	-	___	_____	_____
ENSP 102	Intro. to Environmental Policy	3	Sp	-	___	_____	_____
ENSP 400 (AS)	Capstone in Env. Sci & Policy	3	Sp, F	Senior year; ENSP 101 and 102	___	_____	_____
Calculus:							
MATH 140 (MS)	Calculus I	4	Sp, F, Su	dept. perm. or MATH 115 w/C or better	___	_____	_____
Statistics (one):							
BIOM 301	Introduction to Biometrics	3	Sp, F	MATH 115	___	_____	_____
ECON 321	Economic Statistics	3	Sp, F	ECON 200, 201, MATH 220	___	_____	_____
PSYC 200	Statistical Methods in Psychology	3	Sp, F, Su	PSYC 100, MATH 111 or 140 or 220	___	_____	_____
STAT 400	Applied Prob and Statistics I	3	Sp, F, Su	MATH 141	___	_____	_____
Chemistry:							
CHEM 131/132 (PL)	General Chemistry I	3/1	Sp, F, Su	placement in MATH 113 or higher			
Earth Sciences:							
ENST 200 (LL) *and*	Fundamentals of Soil Science *and*	4	Sp	CHEM 131/132 or dept. perm.	___	_____	_____
GEOL 100/110 (PL)	Physical Geology/Lab	3/1	Sp, F, Su	-	___	_____	_____

And: One (1) course from 3 of the following 4 categories:

Biology:							
BSCI 106 (LL)	Principles of Biology II	4	Sp, F, Su	placement in MATH 110 or higher			
Economics (one):							
AREC 240 (SB)	Intro. to Economics and the Envir	4	Sp	MATH 220 or higher recommended	___	_____	_____
ECON 200 (SB)	Principles of Micro-Economics	4	Sp, F, Su	MATH 110 or higher	___	_____	_____
Geography (one):							
GEOG 100 (SB)	Intro to Geography	3	F	-	___	_____	_____
GEOG 123 (PS)	Causes and Impl of Global Chng	3	Sp	-	___	_____	_____
GEOG 130 (SB/D)	Developing Countries	3	F, Su	-	___	_____	_____
GEOG 140 (PS)	Natural Disasters	3	F	-	___	_____	_____
GEOG 202 (SB)	Intro to Human Geography	3	Sp, Su	-	___	_____	_____
Govt & Politics (one):							
AREC 332	Intro. to Natural Resource Policy	3	Sp	AREC 240 or ECON 200. *Offered Spring of "odd" years, e.g., 2013.*	___	_____	_____
ENSP 330	Introduction to Environmental Law	3	F, Sp	Permission of dept; Junior standing.	___	_____	_____
ENSP 340	Water: Science, Ethics, and Law	3	Sp	Permission of dept; Junior standing.	___	_____	_____
GVPT 273	Intro. to Environmental Politics	3	Sp	GVPT 170 or ENSP 102	___	_____	_____

Required for EARTH SURFACE PROCESSES: [redacted] *are no longer offered.*

Course	Description	Cr	Offered	Prerequisites	Grade	Completed	Notes
CHEM 231/232	Organic Chemistry I	4	Sp, F, Su	CHEM 131/132			
GEOL 102	Historical Geology	4	Sp	GEOL 100 or dept perm.			
GEOL 340	Geomorphology	4	Sp	GEOL 100/110			
GEOL 342	Sedimentation and Stratigraphy	4	Sp	GEOL 322 or dept. perm.			
GEOL 451	Groundwater Geology	3	Sp	CHEM 131/132, MATH 140, and GEOL 110. Coreq. GEOL 342			
GEOL 452	Watershed and Wetland Hydrology	3	F	CHEM 131/132, GEOL 110, and (GEOL 322 or 340 or 341 or 342)			
Select one:							
GEOL 436	Biogeochemistry	3	F	GEOL 100/110, CHEM 131/132, and MATH 140 or 220	___	_____	_____
GEOL 444	Low-Temperature Geochemistry	4	F	GEOL 100/110, GEOL 322, CHEM 131/132, MATH115	___	_____	_____
Select one:							
AOSC 200	Weather and Climate	3	Sp, F	Recommend coreq. AOSC 201	___	_____	_____
GEOG 445	Climatology	3	Sp	GEOG 345	___	_____	_____
GEOL 437	Global Climate Chng: Past & Pres	3	F	CHEM 131/132, MATH115, GEOL 100	___	_____	_____
Select three:							
ENST 414	Soil Morph Genesis and Classif.	4	F	ENST 200	___	_____	_____
[redacted]	[redacted]	3	*	ENST 200	___	_____	_____
ENST 421	Soil Chemistry	4	Sp	ENST 200	___	_____	_____
ENST 422	Soil Biochem & Microbial Ecol	3	Sp	ENST 200, CHEM 105/232	___	_____	_____
ENST 423	Soil-Water Pollution	3	F	ENST 200, CHEM 105/232	___	_____	_____
GEOL 322	Mineralogy	4	Sp	GEOL 110 and CHEM 131/132	___	_____	_____
GEOL 341	Structural Geology	4	F	GEOL 102 or dept perm	___	_____	_____
GEOL 386	Experiential Learning	3-6	Sp, F	Dept perm.	___	_____	_____
GEOL 445	High Temperature Geochemistry	4	F	CHEM 131/132 and GEOL 322	___	_____	_____
MATH 141	Calculus II	4	Sp, F, Su	MATH 140 or equivalent	___	_____	_____
No more than one of:							
GEOG 372 *or*	Remote Sensing	3	Sp, Su, W	-	___	_____	_____
[redacted]	[redacted]	3	*	-	___	_____	_____

>>> Advising notes, approved substitutes, etc.

EARTH SURFACE PROCESSES: Sample Graduation Plan

Reviewed 5/10/10 - WW

- NOTE: This worksheet is for use as an advising tool to help you prepare your own graduation plan. It will necessarily be modified depending upon when you declare this concentration, and depending upon course scheduling/availability. You should discuss your plan regularly and modify it as appropriate in consultation with your advisor during pre-registration advising.

Fall 1	**Cr**	**Spring 1**	**Cr**	**SS I**	**Fall 2**	**Cr**	**Spring 2**	**Cr**	**SS I**
MATH 115	3	MATH 140 *	4		GEOL 322 ** (RE-1)	4	GEOL 340 *	4	
GEOL 100/110	4	GEOL 102	4		AREC 240	4	ENST 200	4	
ENSP 101	3	ENSP 102	3		Core HA/HL/HO/SH	3	BIOM 301	3	
Core HA/HL/HO/SH	3	CHEM 131/132	4		CHEM 231/232	4	Core HA/HL/HO/SH	3	
ENGL 101	3			**SS II**					**SS II**
	16		15			15		14	
Winter					**Winter**				

Fall 3	**Cr**	**Spring 3**	**Cr**	**SS I**	**Fall 4**	**Cr**	**Spring 4**	**Cr**	**SS I**
GEOG 445 **or** GEOL 437 **or** METO 200	3	GEOL 451	3		GEOL 452	3	ENSP 400	3	
GEOL 436 **or** GEOL 444	3	GEOL 342	3		CORE Adv Writing	3	CORE Adv Studies	3	
Free elective	3	**Free elective**	3		ENSP386++	3	**Free elective**	3	
Core HA/HL/HO/SH	3	Rest Elec -2	3		Rest Elec - 3	3	**Free elective**	3	
Gvpt or Geog category	3	Core SB	3	**SS II**	**Free elective**	3	**Free elective**	3	**SS II**
	15		15			15		15	
Winter					**Winter**				

Advising considerations:

* If you complete **MATH 140** during the Fall of freshman year, you may then take **GEOL 340** during the Spring of freshman year.

** **GEOL 322** is a pre-requisite for GEOL 342.

++ An **Internship** is ***strongly recommended*** but not required in this Concentration.

ENVIRONMENTAL RESTORATION & MANAGEMENT

Reviewed: 4.7.12

UM Core: ENGL 101_____, (HL)_____, (HA) _____, (HL/HA/HO/IE) _____, (SH) _____, Diversity _____
Adv. Writing _____, Adv. Studies_____, (SB) __(AREC240)__(SB/IE) _____.

Grading Policy: Environmental Science and Policy students must earn C- grades or higher in all ENSP core courses and in all required courses and restricted electives of the selected area of concentration.

Required from ENSP Core:

Course	Title	Cr	Offered *	Prerequisites	Grade	Completed	Notes
All three:							
ENSP 101 (PS)	Intro. to Environmental Science	3	F	-	___	_____	_____
ENSP 102	Intro. to Environmental Policy	3	Sp	-	___	_____	_____
ENSP 400 (AS)	Capstone in Env. Sci & Policy	3	Sp, F	Senior year; ENSP 101 and 102	___	_____	_____
Calculus:							
MATH 140 (MS)	Calculus I (recommended)	4	Sp, F, Su	dept. perm. or MATH 115 w/C or better	___	_____	_____
or MATH 220 (MS)	Elementary Calculus I	3	Sp, F, Su	dept. perm. or MATH 113, or 115	___	_____	_____
Statistics (one):							
BIOM 301	Introduction to Biometrics	3	Sp, F	MATH 115	___	_____	_____
Biology:							
BSCI 106 (LL)	Principles of Biology II	4	Sp, F, Su	placement in MATH 110 or higher			
Chemistry:							
CHEM 131/132 (PL)	General Chemistry I	3/1	Sp, F, Su	placement in MATH 113 or higher			
Earth Sciences:							
ENST 200 (LL) ***and***	Fundamentals of Soil Science	4	Sp	CHEM 131/132 or dept. perm.	___	_____	_____
GEOG 201/211 *or*	Geog of Environmental Systems/Lab	3/1	F	-	___	_____	_____
GEOL 100/110	Physical Geology/Lab		Sp, F, Su	-			
Economics:							
AREC 240 (SB)	Intro. to Economics and the Envir.	4	Sp	MATH 220 or higher recommended	___	_____	_____
Govt & Politics:							
ENSP 330	Introduction to Environmental Law	3	Sp, F	Permission of dept; Junior standing.	___	_____	_____

Cont'd →

Requirements for ENVIRONMENTAL RESTORATION & MANAGEMENT

FUNDAMENTALS AND BACKGROUND (21-22 credits):

Course	Description	Cr	Offered	Prerequisites	Grade	Completed	Notes
BSCI 105	Principles of Biology I	4	F, Sp	MATH 110 placemt or higher			
BSCI 361	Ecology	4	Sp	BSCI 106 and MATH 220			
CHEM 231/232	Organic Chem I and Lab	3/1	F, Sp	CHEM 131/132			
GEOL 451 *or* GEOL 452	Groundwater Geol *or* Watershed Geol	3 3	Sp Fa	Permission of instructor			
MATH 221 *or* 141	Calculus II	3 or 4	F, Sp	MATH 220 or 140			
PHYS 121	Principles of Physics I	4	F, Sp	MATH 115			

CARTOGRAPHY, REMOTE SENSING, and GIS: Choose 2 courses from those listed below **(6-7 credits):** [redacted]

Course	Description	Cr	Offered	Prerequisites	Grade	Completed	Notes
GEOG 372 *or* [redacted]	Remote Sensing *or* [redacted]	3	Sp,W, Su F				
GEOG 373 *or* [redacted]	Geographic Information Systems *or* [redacted]	3 4	F,W, Su Sp				
GEOG 472	Adv Remote Sensing	3	Fa	GEOG 372			
GEOG 473	Adv Geographic Information Systems	3	Sp	GEOG 373			
GEOG 475	Adv Computer Cartography	3	Sp	GEOG 373			

SYNTHESIS & APPLICATION - 9 credits:

Course	Description	Cr	Offered	Prerequisites	Grade	Completed	Notes
ENSP 386	Internship	3	F, Sp				
ENSP 330	Introduction to Environmental Law	3	F	Permission from ENSP office			
ENST 444 *or* GEOL453	Restoration Ecology Ecosystem Restoration	3 3	F F	MATH 220 Junior standing.			

Cont'd →

RESTRICTED ELECTIVES – 15 credits total – Choose 2 courses (6 credits) from one area; **and** 3 courses (9 credits) from the other area.

Area 1. Biological Resources – choose at least two courses:

Course	Description	Cr	Offered	Prerequisites	Grade	Completed	Notes
BSCI 363	Biology of Conserv and Extinction	3	Sp	BSCI 106			
BSCI 375	Biological Oceanography	3	TBA	Prereq.: BSCI 207 or dept. perm.			
BSCI 460/461 *or* GEOG 442	Plant Ecology (with Lab) *or* Advanced Biogeography	3/2 3	Sp F	BSCI 361 or GEOG 342			
BSCI 462/463	Population Ecology	4-6	F	BSCI 106 and MATH 220			
BSCI 467	Freshwater Biology	4	F	Prereq.: BSCI 207 or dept. perm.			
ENST 373	Natural History of the Chesapeake Bay	3	F	One laboratory course in biology			
ENST 450	Wetland Ecology	3	F	BIOM 301. *Note: Course conflicts with ENSP 400, so plan accordingly.*			
ENST 460	Wildlife Management	3	Sp				
ENST 461	Urban Wildlife Management	3	F				
ENST 479	Tropical Ecology and Rest Mgmt	3	Sp	BSCI 106. *Course has req'd travel – study component.*			
PLSC 400	Environmental Plant Physiology	3	Sp				
PLSC 471	Forest Ecology	3	Sp	BSCI 106 or PLSC 201			

- **Advising notes, Approved course substitutions, etc:**

Area 2. Earth and Water Resources – choose at least two courses:

Course	Description	Cr	Offered	Prerequisites	Grade	Completed	Notes
GEOG 340	Geomorphology	3	Fa 12	*Note new semester for this course.*			
GEOG 445	Climatology	3	Sp	GEOG 345			
GEOG 441	The Coastal Ocean	3	Sp	GEOG201 or GEOG140 or equiv.			
GEOL 451** *or* GEOL 452**	Groundwater Geology *or* Watershed and Wetland Geology	3	Sp F	Permission of the instructor			
ENST 308	Field Soil Morphology – soil judging or intensive field course; ck with advisor.	3	F				
ENST 413	Soil and Water Conservation	3	Sp	ENST 200			
ENST 414	Soil Morph, Genesis and Class.	3	F	ENST 200			
ENST 421	Soil Chemistry	3	Sp	ENST 200			
ENST 423	Soil-Water Pollution	3	F	ENST 200 and CHEM 231/232 or perm			
ENST 427	Nonpoint Source Pollution Assessment	3	F	One course in hydrology or perm			
ENST 430	Wetland Soils	3	Sp	ENST 200			
ENST 451	Water Quality	3	Sp	One year of chemistry			

** You may not use the same course twice, e.g., GEOL 451 or 452 once in "Fundamentals and Background" and again in "Earth and Water Resources"

- **Advising notes, Approved course substitutions, etc:**

ENVIRONMENTAL RESTORATION & MANAGEMENT: Sample Graduation Plan

Reviewed 4/22/11 - WW

- NOTE: This worksheet is for use as an advising tool to help you prepare your own graduation plan. It will necessarily be modified depending upon when you declare this concentration, and depending upon course scheduling/availability. You should discuss your plan regularly and modify it as appropriate in consultation with your advisor during pre-registration advising.

Fall 1	Cr	Spring 1	Cr	SS I	Fall 2	Cr	Spring 2	Cr	SS I
ENSP 101	3	ENSP 102	3		CHEM 131/132	4	CHEM 231/232*	4	
BSCI 106	4	BSCI 105	4		PHYS 121	4	ENST 200	4	
GEOG201/211	4	ENGL101	3		AREC 240	4	**Elective**	3	
MATH 220	3	MATH 221	3		Core HA/HL/HO/SH/SB	3	Core HA/HL/HO/SH/SB	3	
UNIV 100	1	Core HA/HL/HO/SH/SB	3	**SS II**		15		14	**SS II**
	15		16						
Winter					**Winter**				

Fall 3	Cr	Spring 3	Cr	SS I	Fall 4	Cr	Spring 4	Cr	SS I
Cart, RemSens or GIS	3	BIOM 301	3		CORE Adv Writing	3	CORE Adv Studies	3	
Rest Elec – E & W	3	BSCI 361	3		Cart, RemSens or GIS	3	Rest Elec – E & W	3	
ENSP 330	3	Rest Elec – Biol Res	3		ENST 444	3	Rest Elec	3	
Elective **or** PHYS 122*	3-4	GEOL 451 **or** GEOL 452	3		ENSP 386	3	ENSP 400	3	
Core HA/HL/HO/SH/SB	3	Core HA/HL/HO/SH/SB	3	**SS II**	Rest Elec – Biol Res	3	**Elective**	3	**SS II**
	16		15			15		15	
Winter					**Winter**				

Advising Considerations:

* Students planning to attend graduate school should take **CHEM 231/232** and **PHYS 122.**

UNIVERSITY OF MARYLAND

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Phone 301-405-1343
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Department of Environmental Science and Technology

October 12, 2012

Dr. Wendy L. Whittemore, Associate Director
Environmental Science and Policy Program
0216 SYMONS HALL
University of Maryland
College Park, MD 20742

Dear Dr. Whittemore:

I am writing on behalf of ENST Chair Bill Bowerman with regard to your proposed new ENSP concentration in "Environmental Geosciences and Restoration" that you plan to initiate in conjunction with discontinuing the two specializations in "Earth Surface Processes" and "Environmental Restoration and Management". We have reviewed the proposal and conclude that this will have little impact on the classes we are offering in ENST and we would be willing to absorb any few additional students into our classes that the new specialization might generate. Good luck with the proposal.

Sincerely,

Martin C. Rabenhorst
Professor of Pedology
Director of Graduate Studies

Cc: William Bowerman