ASU new college
ARIZONA STATE UNIVERSITY

TO: Senate Curriculum and Academic Programs Committee

FROM: Elizabeth Langland, Dean, New College of Interdisciplinary Arts and Sciences

DATE: November 17, 2010

SUBJECT: Concentration in Environmental Science (within existing Life Sciences B.S.)

I am happy to submit for your review the attached, proposed, revised concentration in Environmental Science (within the existing Life Sciences B.S.), which addresses the concerns you had identified. It has been reviewed and has received approval through the appropriate governance procedures in the College.

New College of Interdisciplinary Arts and Sciences
Office of the Dean

Mailing Address: PO Box 37100, Phoenix, AZ 85069-7100
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ASU new college
ARIZONA STATE UNIVERSITY

TO: NCIAS Curriculum Committee

FROM: Todd R. Sandrin, Ph.D.
Associate Professor / Associate Director
Division of Mathematical and Natural Sciences (MNS)

DATE: November 9, 2010

RE: Proposed establishment of **Environmental Science Concentration** (within existing Life Sciences B.S.)

Per guidelines detailed in the relevant document regarding establishing concentrations ("Establishing Undergraduate Concentrations", Office of the Executive Vice President and Provost of the University", Revised 07/08), a concentration in **Environmental Science** is proposed. This concentration is a formalized selection of courses within the existing Life Sciences B.S. degree program. Specifically, the concentration:

- Requires 16 semester hours, 12 of which are upper division and
- Is offered by MNS and is intended exclusively for students pursuing the Life Sciences B.S. degree.

This concentration will allow students to tailor their courses of study to interests they possess in the science of the environment to help prepare them for careers in both the public and private sectors (e.g., in environmental consulting, environmental remediation, natural resource management, etc.) as well as entry into graduate programs in environmental science and related disciplines. The concentration will leverage existing and future faculty expertise to create a curriculum that provides both foundational and advanced coursework in environmental science. The curriculum will require students to approach environmental science from an interdisciplinary perspective, in part, by requiring coursework in environmental ethics and policy.

In addition to responses to questions raised by the University Provost's Academic Council to enhance this proposal, this proposal includes each of the items listed in the "Proposal Procedures Checklist":

Division of Mathematical and Natural Sciences
New College of Interdisciplinary Arts and Sciences
Mailing address: P O Box 37100, Mail Code 2352, Phoenix, AZ 85069-7100
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1. A supporting letter from the Director of MNS, Dr. Roger Berger, verifying that: A. the Environmental Science concentration has been reviewed and has received faculty approval through appropriate governance procedures in the unit and B. the Division has the resources to support the concentration as presented here, without impacting core course resources.

2. A supporting letter from University Vice President and Dean of the New College of Interdisciplinary Arts and Sciences, Dr. Elizabeth Langland, verifying that the Environmental Science concentration has been reviewed and has received approval through appropriate governance procedures in the college.

3. A statement concerning demand for the program (student/community/market): Enrollment in the MNS has been increasingly steadily. Growth in the Life Sciences B.S. degree program, in particular, has been substantial. Since 2002-03, fall headcounts have more than doubled (from 188 to 393). Growth has been remarkably high in some years (e.g., a headcount increase of 73 in 2005-06). While many of these students pursue a life sciences degree in anticipation of applying to medical and other professional schools, a growing number of our students are interested in life science career paths germane to the environment. In addition, as MNS headcounts continue to increase, we anticipate that many new students will have interests in environmental science, given the timeliness and relevance of this discipline. In fact, high school and community college advisers have already indicated that students they advise will undoubtedly have keen interest in this concentration (see attached email from Kristin Bennes, Glendale Community College adviser).

4. Requirements for the Environmental Science concentration are detailed in the attached draft checksheet. Courses shown in red are required courses for the concentration. A specific set of distribution courses (section C. in checksheet) is not prescribed to provide students with the requisite flexibility to tailor the concentration to their specific career interests and aspirations. The Life Sciences B.S. degree can be completed within 113 of the 120 minimum credits required to earn the bachelor's degree. This leaves 7 upper division elective hours to be completed at the student's discretion.

The proposed Environmental Science concentration can also be completed within 113 credit hours; however, due to the lower division requirement of BIO 130: Introduction to Environmental Science, 10 upper division elective hours are required.

The requirements for the concentration are designed to ensure that students have the flexibility to add additional courses offered on this campus and others within ASU in areas such as conservation, environmental law, sustainability, environmental management, soil science, and hydrology.

The concentration will require the following interdisciplinary courses:

- BIO 130: Introduction to Environmental Science (4)
- CHM 302: Environmental Chemistry (3)
- LSC 334: Environmental Disasters ***OR*** LSC 362: The Human Environment (3)
- IAS/PHI 409: Eco-Community Ethics (HU) (3)
- IAS/PHI 407: Environmental Philosophy/Policy (L) (3)

No new courses are required to launch this concentration. The only new course associated with the concentration is LSC 334, which can be replaced by an existing course, LSC 362: The Human Environment, while LSC 334 is developed.

The BS in Life Sciences with the Environmental Science concentration can be completed within 120 credit hours.

5. Primary faculty participants:

- Thomas Cahill, Assistant Professor, MNS
- Charles Deutch, Associate Professor, MNS
- Chad Johnson, Assistant Professor, MNS
- Peter Jurutka, Assistant Professor, MNS
- Pamela Marshall, Assistant Professor, MNS
- Todd Sandrin, Associate Professor/Associate Director, MNS
- Susannah Sandrin, Assistant Clinical Professor, MNS/CTEL
- Brian Sullivan, Professor, MNS
- Rebecca Ball, Assistant Professor, MNS
- New hire (Fall 2011 Toxicologist/Environmental Chemist, Assistant Professor, MNS)

6. Minimum residency requirement: A minimum of 12 upper-division semester hours in the major with this concentration must be taken in campus resident credit.

7. Other information: A draft checksheet for the concentration is attached.

ASU ARIZONA STATE UNIVERSITY

Major Map: Life Sciences – Bachelor of Science (B.S.) with Environmental Science Concentration

New College of Interdisciplinary Arts and Sciences | Catalog Year: 2010-2011

Course Subject and Title *(courses in bold/shading are critical)*	Hrs.	Upper Division	*Completed ATP:* ☐ *Yes* ☐ *No* Transfer Course/Grade	Minimum Grade if Required	*Completed AGEC:* ☐ *Yes* ☐ *No* Additional Critical Requirement Notes
TERM ONE: 0-15 CREDIT HOURS					
ASU 101: The ASU Experience	1	☐			• ASU 101 is for ASU freshman students only Not required of transfer students • An SAT, ACT, Accuplacer, or TOEFL score determines placement into first-year composition courses • ASU Math Placement Exam score determines placement in Mathematics course • BIO181 & 182 must be completed by end of term 3 • CHM 113 & 116 must be completed by end of term 3
BIO 181: General Biology I -4 (SQ)	4	☐		Grade of C	
CHM 113: General Chemistry I (SQ) – 4)	4	☐		Grade of C	
ENG 101 or 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or 108: English for Foreign Students	3	☐		Grade of C	
MAT 210: Brief Calculus – 3 (MA) or MAT270 Calculus I	3 or 4	☐			
TERM TWO: 16-30 CREDIT HOURS					
• **BIO181: General Biology I -4 (SQ)**	4				• BIO 181 & 182 must be completed by end of term 3 • CHM 113 & 116 must be completed by end of term 3
• **CHM 116: General Chemistry II – 4 (SQ)**	4	☐		Grade of C	
ENG 101 or 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or 108: English for Foreign Students	3	☐		Grade of C	
Humanities, Fine Arts or Social Behavioral Science (HU) or (SB)	3	☐			
MAT 210: Brief Calculus – 3 (MA) or MAT271 Calculus II	3 or 4	☐			
TERM THREE: 31-45 CREDIT HOURS					
• CHM 233/237: General Organic Chemistry I/Laboratory	4	☐		Grade of C	• BIO 181 & 182 must be completed by end of term 3 • CHM 113 & 116 must be completed by end of term 3 • Complete First-Year Composition by the end of semester 3
LSC 347/348: Fundamentals of Genetics/ Laboratory	4	☒		Grade of C	
BIO 130: Introduction to Environmental Science	3	☒			
Humanities, Fine Arts or Social Behavioral Science (HU) or (SB)	3	☐			
TERM FOUR: 46-60 CREDIT HOURS					
BIO320 and LSC 322: Fundamentals of Ecology and Lab	4	☒		Grade of C	
CHM 234/238: General Organic Chemistry II/Laboratory	3/1	☐		Grade of C	
Distribution Course (See DARS)	3	☒			
Literacy or Critical Inquiry (L)	3				
Humanities, Fine Arts or Social Behavioral Science (HU) or (SB)	3	☐			
TERM FIVE: 61-75 CREDIT HOURS					
PHY 111/113: General Physics and Lab	4	☐		Grade of C	
CHM 302: Environmental Chemistry	3	☒			
Distribution Course (See DARS)	3/1	☒			
STP 226: Elements of Statistics (CS)	3				
Humanities, Fine Arts or Social Behavioral Science (HU) or (SB)	3	☐			
TERM SIX: 76-90 CREDIT HOURS					
PHY 112/114: General Physics/Laboratory	3/1	☐			
BIO 353/ 354: Cell Biology and Lab	3/1	☒			
Distribution Course (See DARS)	3/1	☒			
General Studies Awareness Area: Cultural, Global or History	3	☐			
		☐			

ARIZONA STATE UNIVERSITY

Major Map: Life Sciences – Bachelor of Science (B.S.) with Environmental Science Concentration

New College of Interdisciplinary Arts and Sciences | Catalog Year: 2010-2011

Course Subject and Title *(courses in **bold/shading** are critical)*	Hrs.	Upper Division	Transfer Course/Grade	Minimum Grade if Required	Additional Critical Requirement Notes
TERM SEVEN: 91-105 CREDIT HOURS					
PHI 407: Environmental Philosophy and Policy	3	☒		Grade of C	• Language and Cultures: see Additional Notes, below
Choose 1Environmental course from the following: LSC 362: The Human Environment LSC 394: Environmental Disasters	3	☒		Grade of C	
Language and Cultures: Upper Division G or C	3	☒		Grade of C	
General Studies Awareness Area: Cultural, Global or History	3	☐		Grade of C	
		☐			
TERM EIGHT: 106-120 CREDIT HOURS					
PHI 409: Eco-Community Ethics	3	☒		Grade of C	• Language and Cultures: see Additional Notes, below
Distribution Course (See DARS)	3/1	☒		Grade of C	
General Studies Awareness Area: Cultural, Global or History	3	☐		Grade of C	
Language and Cultures: Upper Division G or C	3	☒			

Graduation Requirements Summary:

Total Hours (minimum 120)	Total UD Hrs (minimum 50)	Cumulative GPA (2.00 minimum)	Major GPA (2.00 minimum)	Total Hrs at ASU (minimum 30)	Hrs Resident Credit for Academic Recognition (minimum 56)	Total Comm. College Hrs. (64 Max)

General University Requirements: Legend

- General Studies Core Requirements:
  - Literacy and Critical Inquiry (L)
  - Mathematical Studies (MA)
  - Computer/Statistics/Quantitative applications (CS)
  - Humanities, Fine Arts, and Design (HU)
  - Social and Behavioral Sciences (SB)
  - Natural Science-Quantitative (SQ)
  - Natural Science-General (SG)
- General Studies Awareness Requirements
  - Cultural Diversity in the US (C)
  - Global Awareness (G)
  - Historical Awareness (H)
- First-Year Composition

Additional Notes:

New College of Interdisciplinary Arts & Sciences Requirements:

- Mathematics. Unless a specific math course is listed, students must complete MAT 142 or any MAT course for which MAT 117 or higher level MAT course is a pre-requisite. The mathematics requirement must be completed with a grade of "C" or better.

- A minimum of 12 upper-division semester hours in the major must be taken in campus resident credit. No credit is granted toward fulfilling major or minor requirements in any upper-division course in the subject of the major unless the grade in that course is at least a "C".

- Each student in the College is required to demonstrate proficiency in the analysis of language and cultures and mathematics by passing an examination or by completing the courses specified below with a grade of "C" or higher in each course. Students considering graduate work after completion of a bachelor's degree should consult with faculty advisors regarding language requirements in their intended areas of study.

  - Language and Cultures: This requirement may be satisfied through one of the following:
    1. completion of secondary education at a school in which the language of instruction is not English
    2. completion of a language course at the intermediate level (202 or equivalent), including American Sign Language IV
    3. completion of upper division course(s) taught in a foreign language, taken in the United States or the relevant country;
    4. completion of six semester hours of upper-division courses that have a Global Awareness (G) or Cultural Diversity (C) designation, in addition to the courses used to meet the University General Studies requirements or four (4) sequential semesters of one foreign language or two (2) semesters of a current computer language. Adjustment to upper division hours is required if lower division courses are used.
    5. completion of two sequential semesters of coursework in a current computer language

New College of Interdisciplinary Arts & Sciences

Division of Mathematical & Natural Sciences

Bachelor of Science: Life Sciences ENVIRONMENTAL SCIENCE CONCENTRATION

Catalog Year: 2009-2010

Academic/Major Advising Appointments: (602) 543-6050

Course Title & Prefix	Sem /Yr	Grade
A. Core Courses (20 Credit Hours)		
BIO 187 General Biology I (4) (SG)		
BIO 188 General Biology II (4) (SQ)		
BIO 320 Fundamentals of Ecology (3)		
LSC 322 Fundamentals of Ecology Laboratory (1)		
LSC 347 Fundamentals of Genetics (3)		
LSC 348 Fundamentals of Genetics Laboratory (1)		
BIO 353 Cell Biology (3)		
BIO 354 Cell Biology Laboratory (1)		
B. Cognate (32Credit Hours)		
CHM 113 General Chemistry (4) (SQ)		
CHM 116 General Chemistry with Qualitative Analysis (4) (SQ)		
CHM 233 General Organic Chemistry Lecture (3)		
CHM 237 General Organic Chemistry Laboratory (1)		
CHM 234 General Organic Chemistry Lecture I (3)		
CHM 238 General Organic Chemistry Laboratory II (1)		
PHY 111 General Physics (3) (SQ)		
PHY 113 General Physics Laboratory (1) (SQ)		
PHY 112 General Physics (3) (SQ)		
PHY 114 General Physics Laboratory (1) (SQ)		
MAT 210 Brief Calculus (3) (MA)		
STP 226 Statistics (3) (CS)		
General Electives needed to fulfill 120 graduation hours or general studies requirements:		

Course Title & Prefix	Sem /Yr	Grade
C. Distribution & Concentration Courses		
Students must take at least 18 hours from these courses. This includes a minimum of one course from each of the following groups: Cellular Molecular and Physiological Biology, Organismal Biology and Integrative Systems Ecology. No more than six semester hours of internship, seminar, externship, proseminar or individualized instruction may count toward the major (LSC 350, 450, 484, 498, or 499).		
Cellular, Molecular, and Physiological Biology		
PLB 308 Plant Physiology (4)		
LSC 358 Animal Physiology (3)		
LSC 359 Animal Physiology Laboratory (1)		
BCH 361 Principles of Biochemistry (3)		
LSC 367 Elementary Biochemistry Laboratory (1)		
BIO 443 Molecular Genetics (3)		
Organismal Biology		
PLB 310 Flora of Arizona (4)		
BIO 331 Animal Behavior (3)		
BIO 370 Vertebrate Zoology (4)		
BIO 385 Invertebrate Zoology (4)		
MIC 444 The Microbial Universe (3)		
MIC 445 The Microbial Universe Laboratory (1)		
Integrative Systems Ecology		
PLB 307 Comparative Plant Diversity (4)		
BIO 345 Organic Evolution (3)		
LSC 408 Population Biology		
BIO 474 Herpetology (3)		
Concentration		
BIO 130 Introduction to Environmental Science (4)		
ETM 406 Environmental Chemistry (3)		
Choose ONE of the following courses:		
LSC362 The Human Environment (3)		
LSC 334 Environmental Disasters (3)		

*Students taking Biometry for their mathematics cognate requirement may not also count it as an elective towards the major.
**These courses are graded pass/fail.

For more information, visit our web site at http://www.west.asu.edu/asadv
Material on check sheet is unofficial and subject to change. 11/10/2010

New College of Interdisciplinary Arts & Sciences

Division of Mathematical & Natural Sciences

Bachelor of Science: Life Sciences ENVIRONMENTAL SCIENCE CONCENTRATION

Catalog Year: 2009-2010

Academic/Major Advising Appointments: (602) 543-6050

UNIVERSITY AND COLLEGE REQUIREMENTS

GENERAL STUDIES (35 hours minimum): All students enrolled in a baccalaureate degree program must successfully complete minimum of 35 semester hours of approved general studies courses. Many General Studies courses are approved as satisfying more than one requirement. The following conditions govern the application of courses toward General Studies requirements:

1. A single course may be used to satisfy one core area and a maximum of two awareness area requirements.
2. A single course may be used to satisfy a maximum of two awareness area requirements.
3. A single course cannot be used to satisfy two core area requirements, even if it is approved for more than one core area.

COURSE NUMBER AND TITLE		SEM/YR	SEM HR	GENSTDY	GRADE	UP DIV
ASU 101						

FIRST YEAR COMPOSITION (3-6 hours): ENG 101 and 102 **or** ENG 105 (grade of "C" or better required)

FIVE CORE AREAS (Literacy, Mathematical Studies, Humanities, Social & Behavioral Sciences, and Natural Sciences)

Literacy and Critical Inquiry (6 hours): Requires at least three hours upper division.

IAS/PHI 407	ENVIRONMENTAL PHILOSOPHY/POLICY		3	L		✓
				L		

Mathematical Studies (6 hours): Requires one course from Mathematics (MA) category and one from Statistics, Quantitative Reasoning, or Computer Applications (CS) categories. The MA course must have a grade of "C" or better to meet the College's Mathematics Requirement.

				MA		
				CS		

Combined Humanities and Fine Arts/Social and Behavioral Sciences (15 hours): Must complete nine (9) hours in one core area, six (6) in the other; must include at least one upper division course. See catalog for details.

				HU		
				HU		
IAS/PHI 310	ENVIRONMENTAL ETHICS		3	HU/SB		✓
				SB		
				SB		

Natural Sciences (8 hours): Requires two natural sciences laboratory courses: Natural Science – Quantitative (SQ) or Natural Science – (SG). Of these, at least four semester hours must be taken from the SQ category. See catalog for restrictions.

				SQ		
				SQ/SG		

THREE AWARENESS AREAS (6 hours): Requires courses representing all 3 of the awareness areas: Cultural Diversity (C), Global Awareness (G), Historical Awareness (H).

				C		
				G		
				H		

Language & Cultures Requirement:

The New College of Interdisciplinary Arts and Sciences requires either:

1. Knowledge of one foreign language equivalent to the completion of two years study at the college level (through 202 or equivalent) **or**
2. Completion of a foreign language course at the 300 level, taught in the foreign language **or**
3. Completion of secondary education at a school in which the language of instruction is not English **or**
4. Completion of 6 hours of upper division courses that have a Global Awareness (G) or Cultural Diversity (C) designation, in addition to the courses used to meet the University General Studies requirements, **or**
5. Completion of two sequential semesters of course work in a current computer language.

APPENDIX
OPERATIONAL INFORMATION FOR UNDERGRADUATE PROGRAMS
(This information is used to populate the Degree Search /catalog website.)

1. Contact and Support Information

Office Location (Building & Room): CLCC 217

Campus Telephone Number: 602-543-6050

Program email address: mns@asu.edu

Program website address: http://newcollege.asu.edu/mns/

2. Additional Program Description Information

A. Additional program fee required for this program? Yes ☐ No ☒

B. Does this program have a second language requirement? Yes ☐ No ☒

3. Career Opportunities & Concentrations Provide a brief description of career opportunities available for this degree program. If program will have concentrations, provide a brief description for each concentration.

According to the 2010-2011 Occupational Outlook Handbook (US Bureau of Labor Statistics, 2010), employment of Environmental Scientists is expected to grow by 28 percent between 2008 and 2018. This is far more rapid growth than average rate of growth for all occupations. The Handbook indicates that most rapid growth will occur in the private sector (primarily, in private environmental consulting firms).

This concentration will allow students to tailor their courses of study to interests they possess in the science of the environment to help prepare them for careers in both the public and private sectors (e.g., in environmental consulting, environmental remediation, natural resource management, etc.) as well as entry into graduate programs in environmental science and related disciplines.

4. Additional Admission Requirements If applicable list any admission requirements (freshman and/or transfer) that are higher than and/or in addition to the university minimum undergraduate admission requirements.)

none

5. Keywords List all keywords used to search for this program. Keywords should be specific to the proposed program.

Environmental science, environment, sustainability, biology, chemistry, soil, water, geology, hydrology, contamination, pollution

6. Area(s) of Interest

A. Select one (1) primary Area of Interest from the list below that applies to this program.

- ☐ **Architecture, Construction & Design**
- ☐ **Artistic Expression & Performance**
- ☒ **Biological Sciences, Health & Wellness**
- ☐ **Business, Management & Economics**
- ☐ **Communication & Media**
- ☐ **Computing & Mathematics**
- ☐ **Education & Teaching**
- ☐ **Engineering & Technology**
- ☐ **Environmental Issues & Physical Science**
- ☐ **Interdisciplinary Studies**
- ☐ **Languages & Cultures**
- ☐ **Law & Justice**
- ☐ **Social Science, Policies & Issues**

B. Select any additional Areas of Interest that apply to this program from the list below.

- ☐ **Architecture, Construction & Design**
- ☐ **Artistic Expression & Performance**
- ☐ **Biological Sciences, Health & Wellness**
- ☐ **Business, Management & Economics**
- ☐ **Communication & Media**
- ☒ **Computing & Mathematics**
- ☐ **Education & Teaching**
- ☒ **Environmental Issues & Physical Science**
- ☒ **Engineering & Technology**
- ☐ **Interdisciplinary Studies**
- ☐ **Languages & Cultures**
- ☐ **Law & Justice**
- ☐ **Social Science, Policies & Issues**

Reponses to University Provost's Academic Council (UPAC)
Proposal for Concentration in Environmental Science under the BS in Life Sciences

- **It's not clear what the level of demand is for this program. Do you have any data (e.g. enrollments in courses related to this area) that demonstrate student interest in Environmental Science? Are jobs in this area increasing and are there unfilled vacancies? Are there other environmental science programs in the area and if so are they fully enrolled?**

A survey of current courses with relevance to Environmental Science offered recently (2007-2010) at ASU (Table 1) suggests that there is considerable student interest in Environmental Science. Average enrollment in these courses has ranged from 80% (in CEE 361: Introduction to Environmental Engineering and in GPH 210: Society and the Environment) to 101% (GLG 110: Geologic Disasters and the Environment). Enrollment in CHM 301: Environmental Chemistry (a course included in our Environmental Science concentration) has averaged 96%. Similarly, enrollment in GPH 405: Energy and the Environment has averaged 98%. Taken together, these data suggest that there is strong student interest in Environmental Science.

According to the 2010-2011 Occupational Outlook Handbook (US Bureau of Labor Statistics, 2010), employment of Environmental Scientists is expected to grow by 28 percent between 2008 and 2018. This is far more rapid growth than average rate of growth for all occupations. The Handbook indicates that most rapid growth will occur in the private sector (primarily, in private environmental consulting firms).

Environmental Science programs are offered at both NAU and The University of Arizona. Neither institution offers a concentration in Environmental Science. NAU offers a minor in Environmental Science (see attachment) that requires 22 credit hours. In conversation, Abe Springer at NAU indicated previously that the Environmental Science programs at NAU have been popular. An email request was sent to Dr. Springer and Dr. Rod Parnell (School of Earth Sciences and Environmental Sustainability at NAU) requesting additional details regarding enrollment in environmental science programs at NAU, but no response was provided at the time of submission of this document. The University of Arizona offers a B.S. in Environmental Science. The head of the Soil, Water and Environmental Science (SWES) department at The University of Arizona, Dr. Jeff Silvertooth, spoke at length via telephone on Friday, September 10 with Dr. Sandrin about the environmental science undergraduate degree program. Dr. Silvertooth indicated that enrollment in the program is up.

Dr. Silvertooth further noted that the SWES degree program in Environmental Science is anchored by programmatic and departmental strengths in soil, earth, and water science (e.g., hydrology). Environmental degree programs at NAU appear strongly grounded in geology and the geosciences. Our proposed concentration in Environmental Science will be anchored by our Divisional strengths in the life sciences and our interdisciplinary

strengths across New College. As such, Dr. Silvertooth enthusiastically agreed that our program will complement existing degree programs in Environmental Science.

When considering course enrollment data, student interest in existing programs in environmental science, and the complementary nature of the program we propose, it seems there is clear demand and need for this program.

- **Under section 4: ETM 406 is missing from the list of requirements. The program requires ETM 406, a course offered at the Polytechnic campus, but there is no letter of support from Poly. Will New College be requesting an offering of this course or will students take the class from Poly? An impact statement or letter of support should be included from Poly.**

  We have replaced ETM 406 with CHM 302 and added this course to section 4. We have requested a letter of support from Poly (Doug Greene, Chair of Applied Sciences and Math in the College of Technology and Innovation), but a letter was not received by the time this document was submitted.

- **Section 5 indicates two new faculty hires. Have these already occurred? If not, what is the status of these positions?**

  An environmental scientist (ecologist), Rebecca Ball (joining us from Dartmouth) has been hired and will join ASU later this month (September). We have an active search for the other hire (an environmental chemist/toxicologist) we referenced. This new faculty member will begin in Fall 2011.

- **Regarding Kelin Whipple's comments: We would like to suggest that Tempe's CHM 302 Environmental Chemistry be included as option in addition to ETM 406. If you choose not to do so, please explain why.**

  We have replaced ETM 406 with CHM 302.

- **In the academic plan follow-up letter, UPAC said: *This concentration should be developed in consultation with Applied Biological Sciences at the Polytechnic; Biological Sciences (ecology and evaluation, Conservation and Sustainability) in Liberal Arts and Sciences; and the School of Sustainability.* The possibilities for collaboration should be discussed with CTI and Sustainability and a letter of support from each unit included with the proposal.**

  We are eager to collaborate and coordinate with relevant programs in CLAS, CTI, and the School of Sustainability. Accordingly, we have requested letters of support from and communicated our enthusiasm for collaboration to CTI (Doug Greene, Chair of Applied Sciences and Math in the College of Technology and Innovation), CLAS (Julie Stromberg, Sharon Hall, and Miles Orchinik), and the School of Sustainability (Chris Boone and

Sander Van Der Leeuw) (see Table 2). An email supporting our proposed concentration was provided by Julie Stromberg and is attached. Dr. Orchinik previously endorsed our concentration.

- **Statements of support or impact from Monica Casper and Miles Orchinik both discuss PHI 310. Correspondence with Monica Casper implies that PHI 310 would be an acceptable option within the curriculum, yet the response to Miles Orchinik says that PHI 310 is not part of the program. Please explain the status of PHI 310 within the Environmental Science concentration.**

  PHI 310 is not part of the program. The course number 310 was erroneously referenced in an earlier draft of our proposal to establish this concentration. Instead, IAS/PHI 409: Eco-Community Ethics (HU) is required by the concentration.

Table 1. Enrollment data (2007-2010) for ASU courses with relevance to Environmental Science.

Semester	Course No.	Course Title	Capacity	Enrolled	% full	Average
2007 Fall	CEE 361	Intro to Environmental Engr	70	69	99	
2007 Fall	CEE 361	Intro to Environmental Engr	35	35	100	
2007 Fall	CEE 361	Intro to Environmental Engr	35	34	97	
2008 Spring	CEE 361	Intro to Environmental Engr	70	45	64	
2008 Spring	CEE 361	Intro to Environmental Engr	70	45	64	
2008 Fall	CEE 361	Intro to Environmental Engr	70	62	89	
2008 Fall	CEE 361	Intro to Environmental Engr	35	35	100	
2008 Fall	CEE 361	Intro to Environmental Engr	35	27	77	
2009 Spring	CEE 361	Intro to Environmental Engr	70	73	104	
2009 Spring	CEE 361	Intro to Environmental Engr	70	73	104	
2009 Summer	CEE 361	Intro to Environmental Engr	30	10	33	
2009 Fall	CEE 361	Intro to Environmental Engr	70	52	74	
2009 Fall	CEE 361	Intro to Environmental Engr	35	35	100	
2009 Fall	CEE 361	Intro to Environmental Engr	35	17	49	
2009 Fall	CEE 361	Intro to Environmental Engr	30	1		
2010 Spring	CEE 361	Intro to Environmental Engr	70	47	67	
2010 Spring	CEE 361	Intro to Environmental Engr	70	47	67	
2010 Summer	CEE 361	Intro to Environmental Engr	30	9	30	
2010 Fall	CEE 361	Intro to Environmental Engr	70	67	96	
2010 Fall	CEE 361	Intro to Environmental Engr	35	34	97	
2010 Fall	CEE 361	Intro to Environmental Engr	35	33	94	80
2007 Fall	CHM 302	Environmental Chemistry	100	94	94	
2008 Fall	CHM 302	Environmental Chemistry	100	101	101	
2009 Fall	CHM 302	Environmental Chemistry	100	99	99	
2010 Fall	CHM 302	Environmental Chemistry	110	97	88	96
2007 Fall	ETM 301	Environmental Management	40	17	43	
2008 Fall	ETM 301	Environmental Management	40	30	75	
2009 Fall	ETM 301	Environmental Management	40	38	95	
2010 Spring	ETM 301	Environmental Management	40	41	103	
2010 Fall	ETM 301	Environmental Management	35	34	97	82

2007 Fall	GLG 110	Geologic Disasters & Environ	75	75	100	
2008 Fall	GLG 110	Geologic Disasters & Environ	75	76	101	
2009 Fall	GLG 110	Geologic Disasters & Environ	75	76	101	
2010 Fall	GLG 110	Geologic Disasters & Environ	75	75	100	
2010 Fall	GLG 110	Geologic Disasters & Environ	30	30	100	101
2007 Fall	GPH 210	Society and Environment	100	104	104	
2007 Fall	GPH 210	Society and Environment	100	107	107	
2007 Fall	GPH 210	Society and Environment	30	1	3	
2008 Spring	GPH 210	Society and Environment	100	101	101	
2008 Spring	GPH 210	Society and Environment	100	112	112	
2008 Fall	GPH 210	Society and Environment	150	152	101	
2008 Fall	GPH 210	Society and Environment	150	155	103	
2009 Winter	GPH 210	Society and Environment	30	9	30	
2009 Spring	GPH 210	Society and Environment	125	127	102	
2009 Spring	GPH 210	Society and Environment	100	102	102	
2009 Spring	GPH 210	Society and Environment	15	15	100	
2009 Spring	GPH 210	Society and Environment	50	50	100	
2009 Summer	GPH 210	Society and Environment	50	40	80	
2009 Summer	GPH 210	Society and Environment	50	38	76	
2009 Summer	GPH 210	Society and Environment	30	1		
2009 Summer	GPH 210	Society and Environment	30	2	7	
2009 Fall	GPH 210	Society and Environment	150	155	103	
2009 Fall	GPH 210	Society and Environment	135	133	99	
2009 Fall	GPH 210	Society and Environment	200	198	99	
2009 Winter	GPH 210	Society and Environment	50	29	58	
2010 Spring	GPH 210	Society and Environment	125	125	100	
2010 Spring	GPH 210	Society and Environment	100	103	103	
2010 Spring	GPH 210	Society and Environment	100	100	100	
2010 Summer	GPH 210	Society and Environment	50	33	66	
2010 Summer	GPH 210	Society and Environment	50	31	62	
2010 Summer	GPH 210	Society and Environment	50	9	18	
2010 Summer	GPH 210	Society and Environment	30	9	30	
2010 Fall	GPH 210	Society and Environment	150	136	91	

2010 Fall	GPH 210	Society and Environment	200	200	100	
2010 Fall	GPH 210	Society and Environment	150	48	32	
2010 Fall	GPH 210	Society and Environment	150	150	100	80
2008 Spring	GPH 405	Energy and Environment	30	28	93	
2010 Spring	GPH 405	Energy and Environment	30	31	103	98

Table 2: Summary of impact statements requested and received.

Institution/Unit	Representative(s)	Support letter/email
Northern Arizona University, School of Earth Sciences and Environmental Sustainability	Abe Springer and Rod Parnell, School of Earth Sciences and Environmental Sustainability	None received at time of submission of these responses
ASU Polytechnic / College of Technology and Innovation	Doug Green, Chair of Applied Sciences and Math	None received at time of submission of these responses
ASU Tempe, School of Life Sciences	Miles Orchinik, Associate Dean for Undergraduate Programs	Attached (received in response to original proposal)
ASU Tempe, School of Life Sciences	Julie Stromberg, Undergraduate Program representative from the Human Dimensions group within SoLS;	Attached
ASU Tempe, School of Sustainability	Chris Boone and Sander van der Leeuw, School of Sustainability	None received at time of submission of these responses
The University of Arizona, Department of Soil, Water and Environmental Science	Jeffrey Silvertooth, Department Chair	Phone conversation (see response to UPAC item #1 above)

Impact Statements:

The following representatives of appropriate units were asked to indicate whether the proposed concentration in Environmental Science would negatively affect their curricula and students.

Unit	Representative(s)
School of Life Sciences	Miles Orchinik (Associate Dean of Undergraduate Programs) Scot Schoenborn (Assistant Director, Academic Services)
School of Earth and Space Exploration	Kip Hodges (Director) Kelin Whipple (Professor)

No representatives indicated any negative impacts.

Relevant email exchanges are appended.

Todd Sandrin

From: Miles Orchinik
Sent: Friday, April 16, 2010 3:55 PM
To: Todd Sandrin
Cc: Roger Berger; Scot Schoenborn; Ben Minteer; Jane Maienschein
Subject: RE: new concentrations in Environmental Science and Forensics

Hi Todd,

SoLS has no objection to the creation of an Environmental Science concentration or a Forensics concentration on the West Campus. We see no negative impact of the new programs on the SoLS undergraduate programs.

For the record, SoLS faculty are not happy about having PHI 310/BIO 324 offered online at West. A tremendous amount of work has gone into developing PHI 310/BIO 324 into a rigorous, high-quality course.

Thanks,

Miles

MILES ORCHINIK
Associate Dean of Undergraduate Programs
SCHOOL OF LIFE SCIENCES
ARIZONA STATE UNIVERSITY
Box 874501 | Tempe AZ 85287-4501 | Life Sciences C wing, room 502
480-965-5084 | orchinik@asu.edu
http://sols.asu.edu/people/faculty/morchinik.php

From: Todd Sandrin
Sent: Friday, April 16, 2010 9:50 AM
To: Miles Orchinik; Scot Schoenborn
Cc: Roger Berger
Subject: FW: new concentrations in Environmental Science and Forensics
Importance: High

Hi Miles and Scot,

I hope this email finds both of you enjoying a pleasant and productive semester. We are eager to move forward with our Environmental Science and Forensics concentrations. Might you indicate to me whether these new programs will impact your students and curricula by **Monday, April 19th**?

Thanks,
Todd Sandrin

From: *Todd Sandrin*
Sent: *Tuesday, April 06, 2010 5:27 PM*
To: *Miles Orchinik; Scot Schoenborn*

Cc: Roger Berger
Subject: new concentrations in Environmental Science and Forensics

Dear Miles and Scot,

We are proposing two new concentrations within our Life Sciences B.S. degree program. One is in Environmental Science and the other is in Forensics. For your reference, I attach the proposals.

As part of the development process, I am writing to determine the impact of these proposals on other academic units and curricula. Might you provide feedback to me regarding whether these new programs will impact your students and curricula by ***Friday, April 9 at 5 pm***?

Thanks, in advance, for you contributions to our efforts to develop these programs.

Best regards,
Todd Sandrin

Todd R. Sandrin, Ph.D.
Associate Professor/Associate Director
Division of Mathematical and Natural Sciences
New College of Interdisciplinary Arts and Sciences

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lab webpage: http://sandrin-lab.asu.edu
Proteomics and Functional Genomics Core Facility webpage: http://newcollege.asu.edu/mns/facilities/proteomics
phone: (602) 543-6934
fax: (602) 543-6073

Todd Sandrin

From: Kelin X Whipple [kxw@asu.edu]
Sent: Monday, April 19, 2010 2:32 PM
To: Todd Sandrin
Subject: SESE Impact Statement for Environmental Science Concentration

Follow Up Flag: Follow up
Flag Status: Flagged

Todd -

Tom Sharp and I have discussed your proposed Environmental Science Concentration, this email I hope will work as our formal impact statement.

It looks like a great idea to add this as a concentration in Life Science -- there should be a strong demand for it.
The concentration is a nice twist to the standard Life Sciences BS,
adding some general education in Environmental Sciences. The courses
LSC 334 Environmental Disasters (new) and LSC 362 the Human Environment sound intriguing. In fact these courses may be of interest to some or our students and it might be great to add these to the electives list for our new BA in Earth and Environmental Studies (depending on the prereqs).

We do have a couple questions about the concentration, though these are not "issues" for an impact statement. Is LSC 362 offered only on the West Campus? Will it also be offered elsewhere in future? Should CHM
302 be listed as an alternative Environmental Chemistry course. CHM 302 is taught on the Tempe Campus each year. We noted the ETM 406 appears to be taught only on POLY campus. LSC 334 sounds interesting, but without a course description its hard to guess what is really covered.

We see no way that this new concentration would negatively impact anything we are doing.

Good luck with your proposal.

Kelin Whipple
Thomas Sharp

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ASU new college
ARIZONA STATE UNIVERSITY

March 15, 2010

To: Whom It May Concern

From: Roger L. Berger, Director

Roger L Berger

Division of Mathematical and Natural Science

Re: Proposal to Establish a Forensics Concentration in the BS in Life Sciences Degree and Proposal to Establish an Environmental Science Concentration in the BS in Life Sciences Degree

These proposals to establish two new concentrations in the Life Sciences BS degree have been discussed and approved by the faculty of the Division of Mathematical and Natural Science.

Offering of these new concentrations will not negatively impact our Division's ability to deliver our current curriculum. These concentrations are composed entirely of courses that we currently offer, except for one proposed new course called Environmental Disasters. But the proposal identifies an alternate course that may be taken in place of this new course, so that, until the new course is developed, students may still progress in the degree.

Roger L Berger, Director
Division of Mathematical and Natural Sciences
New College of Interdisciplinary Arts and Sciences
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