

This template is to be used only by programs that have received specific written approval from the Provost's office to proceed with internal proposal development and review. The proposal template should be completed in full and submitted to the University Provost's Office [mailto:curriculumplanning@asu.edu]. It must undergo all internal university review and approval steps including those at the unit, college, and university levels. A program **may not** be implemented until the Provost's Office notifies the academic unit that the program may be offered.

**College/School/Institute:** New College of Interdisciplinary Arts and Sciences  
**Department/Division/School:** School of Mathematical & Natural Sciences  
**Proposing Faculty Group (if applicable):**  
**If this is an official joint degree program?** No, this is not a joint degree program

*If "Yes" List all the additional college(s)/school(s)/institute(s) that will be involved in offering the degree program and providing the necessary resources. Note: All units offering this program must have collaborated in the proposal development and completed the appropriate unit and college/school approvals.*

**Degree type:** BS-Bachelor of Science  
 If other; provide degree type title and proposed abbreviation:  
**Name of degree program (major):** Environmental Science  
**Are any concentrations to be established under this degree program?** No, concentrations will not be established.  
**Is a program fee required?** No, a program fee is not required.  
**What is the first catalog year available for students to select on the undergraduate application for this this program?** 2015-16  
**Delivery method:** On-campus only (ground courses and/or iCourses)  
*Note: Once students elect a campus or On-line option, students will not be able to move back and forth between the on-campus and the ASU Online options. Approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.*

**Campus/Locations:** indicate all locations where this program will be offered.

Downtown Phoenix       Polytechnic       Tempe       West      Other: Lake Havasu City

**Proposal Contact**

**Name:** Becky Ball      **Title:** Assistant Professor  
**Phone number:** 602-543-2010      **Email:** becky.ball@asu.edu

**DEAN APPROVAL(S)**

**This proposal has been approved by all necessary unit and College/School levels of review. I recommend implementation of the proposed organizational change.**

**College/School/Division Dean name:**

**Signature** \_\_\_\_\_ **Date:** \_\_\_\_ / \_\_\_\_ /20\_\_\_\_

**College/School/Division Dean name:**

*(if more than one college involved)*

**Signature** \_\_\_\_\_ **Date:** \_\_\_\_ / \_\_\_\_ /20\_\_\_\_

*Note: An electronic signature, an email from the dean or dean's designee, or a PDF of the signed signature page is acceptable.*

### 1. Purpose and Nature of Program

Provide a brief program description. Include the distinctive features of the program that make it unique.

The BS program prepares students to pursue careers in environmental science, including but not limited to positions with federal and state agencies, private consulting firms, nongovernment organizations or academic research environments. The curriculum emphasizes many aspects of biological study, including molecular, organismal and ecosystem biology, backed by a strong foundation in chemistry, statistics and geographic information systems. The program also focuses on written communication and management skills that will prepare graduates for the multifaceted, interdisciplinary aspects of their careers in environmental science.

### 2. Student Learning Outcomes and Assessment Methods

#### A. Knowledge, competencies, and skills

List the knowledge, competencies, and skills students should have when they graduate from the proposed degree program. (You can find examples of program Learning Outcomes at (<http://www.asu.edu/oue/assessment.html> )

Outcome 1: Be able to demonstrate knowledge in relevant areas of environmental science including pertinent topics in biology, chemistry, and ecology.

Outcome 2: Be able to demonstrate proficiency in relevant skills and techniques covered in required laboratory and technique classes.

#### B. Assessment

Describe the plan and methods to assess whether students have achieved the knowledge, competencies and skills identified in the Learning Outcomes. (You can find examples of assessment methods at (<http://www.asu.edu/oue/assessment.html> )

Outcome 1: This measure will be met if at least 70% of the students receive grades of C or better on the final paper in CHM 302 and the final exams in BIO 320 and ENV 201.

Outcome 2: This measure will be met if at least 70% of the students receive grades of C or better on the final project in ENV 345 and ENV 385 and on the independent research project in LSC 322 (West) or BIO 320 (Lake Havasu).

### 3. Academic Curriculum and Requirements

#### A. Major Map.

Attach a copy of the “proposed” major map for this degree program and each concentration(s) to be offered. Instructions on how to create a “proposed major map” in BAMB can be found in the Build a Major Map Training Guide.

#### B. Summary of credit hours required for this program

Total credit hours must be 120 and include first year composition, general studies, core/required courses, program specific electives, and any additional requirements (e.g., concentration credits).

Requirements	Credit Hours
<b>First Year Composition</b>	<b>6</b>
<b>ASU 101 (or Equivalent)</b>	2
<b>General Studies</b>	30
<b>Core/required courses</b>	62
<b>Program specific electives</b>	14
<b>Additional requirements</b>	3
<b>Other; please explain</b>	3
<b>Total</b>	<b>120</b>

### C. Core/Required Courses.

i. Total required and/or core course credit hours:

62

ii. List the name, prefix, and credit hours for each required/core course for this program

BIO 181 - General Biology I	4
CHM 113 - General Chemistry I	4
BIO 182 - General Biology II	4
CHM 116 - General Chemistry II	4
PHY 101 - Introduction to Physics	4
CHM 231 - Elementary Organic Chemistry OR CHM 233 - General Organic Chemistry I	3
CHM 235 - Elementary Organic Chemistry Lab OR CHM 237 - General Organic Chemistry Lab I	1
ENV 201 - Fundamentals of Environmental Science	3
PLB 300 - Plant Diversity and Evolution	4
GLG 101 - Introduction to Geology I (Physical)	3
GLG 103 - Introduction to Geology I-Laboratory	1
OR	
GLG 108 - Water Planet	4
LSC 347 - Fundamentals of Genetics	3
ENV 345 - Spatial Analysis in the Environmental Sciences	3
BIO 320 - Fundamentals of Ecology	3
LSC 322 - Fundamentals of Ecology Lab	1
CHM 302 - Environmental Chemistry	3
BIO 370 - Vertebrate Zoology OR BIO 385 Comparative Invertebrate Zoology	4
BIO 422 - Ecosystem Ecology	3
ENV 385 - Environmental Impact Assessment	3
ENV 310 - Soil Science	4

### D. Program Specific Electives.

i. Total required program elective credit hours:

14

ii. List the name, prefix, and credit hours for any program specific electives for this program:

Electives are listed in the major map according to "focus areas". Students may choose to take all of their electives from one focus area to specialize in a certain topic. Alternatively, they may opt for a broader approach and take one elective from each focus area.

#### Chemistry/Toxicology

CHM 234 - General Organic Chemistry II	3
CHM 238 - General Organic Chemistry II Lab	1
CHM 303 - Environmental Chemistry Lab	2
BIO 353 - Cell Biology	3
BCH 371 - Modern Concepts in Biochemistry	3
BCH 372 - Modern Concepts in Biochemistry Lab	1
LSC 375 - Analytical Chemistry for Life Sciences	3
LSC 376 - Analytical Chemistry for Life Sciences Lab	3
BIO 443 - Applied Molecular Genetics and Genomics	3
LSC 475 - Toxicology	3

#### Organismal/Conservation Biology

BIO 385 - Comparative Invertebrate Zoology or BIO 370 Vertebrate Zoology	4
BIO 474 - Herpetology	4
BIO 331 - Animal Behavior	3
BIO 360 - Animal Physiology	3
BIO 410 - Techniques in Conservation Biology & Ecology	3
PLB 308 - Plant Physiology	4
PLB 310 - The Flora of Arizona	4



## 4. New Course Development

### A. Will a new course prefix (es) be required for this degree program? Yes

If yes, list prefix name(s) (i.e. ENG- English) ENV

*Note: A request for a New Prefix form must be completed for each new prefix required and submitted with this proposal: [http://provost.asu.edu/files/shared/curriculum/Prefix\\_Request.doc](http://provost.asu.edu/files/shared/curriculum/Prefix_Request.doc).*

### B. New Courses Required for Proposed Degree Program.

List all new courses required for this program, including course prefix, number and course description.

ENV 201: Fundamentals of Environmental Science (3 credits, lecture)

This course examines the functioning of the earth system and how it has changed over long and short time scales. The emphasis is on understanding global processes and how human activities can disrupt these processes, changing the ability of our global environment to support life. Important feedbacks between biological and physical processes and their effects on the biosphere are emphasized. The response of natural and managed ecosystems to global change will be discussed along with prospects for the future.

Pre-requisite: BIO 181 and 182 with a grade of C or better; CHM 116 with a grade of C or better.

ENV 385: Environmental Impact Assessment (3 credits, lecture)

This course provides an overview of the National Environmental Protection Act (NEPA) and the processes and procedures that guide environmental impact assessments. The environmental impact assessment is an important planning tool that aids decision-makers in mitigating the environmental impact of a wide variety of projects and policies. Similarly, NEPA compliance is required for most federally sponsored actions such as resource extraction and management, energy development, public housing, transportation projects, etc. Many states have similar environmental regulatory processes, and the processes of preparing Environmental Impact Statements and Environmental Assessments have been emulated in more than 100 other countries. The objectives of this course are to provide a basic understanding of NEPA, of the components of Environmental Impact Statements (EISs) and Environmental Assessments (EAs), of the uses of scientific research for project planning and decision making, and of how to prepare the various documents required by state and federal regulations.

Pre-requisite: ENV 201 with a grade of C or better.

ENV 345: Spatial analysis in the environmental sciences (3 credits, lecture/lab hybrid)

This course will help students develop an understanding of the methods, tools and technologies used to collect, display, analyze and interpret spatial data in environmental science and natural resource management. Instruction provides overview of geographic information system (GIS) applications in these fields. Students are introduced to the basics of integrating the global position system (GPS) and remote sensing (RS) into GIS to solve problems in environmental science and natural resource management.

Pre-requisite: ENV 201 with a grade of C or better.

ENV 310: Soil Science (4 credits, lecture/lab hybrid)

This course introduces the fundamental principles of soil science, including physical, chemical, biological, and ecological properties. These principles will be applied to explain the importance of soil as both a natural resource and ecosystem. We will discuss the role of soils as the heart of terrestrial ecosystems, both natural and managed, and the importance of this key natural resource to environmental health and biological productivity. We will also explore how human activity and global change are impacting this vital natural resource and ecosystem that is crucial to life on earth. The laboratory component will also introduce applications and standard methodology for investigating these principles.

Pre-requisite: BIO 320 with a grade of C or better; CHM 116 with a grade of C or better; PHY 101 (or higher) with grade of C or better.

*Note: New course requests must be submitted electronically via Curriculum ChangeMaker and undergo all internal university review and approval steps including those at the unit, college, and university levels.*

## 5. Program Need

Explain why the university needs to offer this program (include target audience and market).

According to the U.S. Department of Labor's Occupational Outlook Handbook (<http://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm>), job opportunities for Environmental Scientists are expected to increase by 15% over the next 10 years, which is faster than the national average, due to increased public interest in environmental hazards and increasing human demands on the environment. A working group of faculty and professionals working for local, state and federal agencies recently met at the Lake Havasu City location, confirming the need for a degree program consisting of the proposed course requirements to prepare students for the problem solving demands of jobs within these agencies today. A foundation in life sciences and the physical environment, knowledge of policy and statistics, in addition to practical skills in communication, spatial analysis, field and lab techniques were all recommended to fulfill future career opportunities in natural resource management with such agencies. The proposed program will also prepare students for graduate school or employment with consulting firms. Currently, 52 students have declared a concentration in Environmental Science within the Life Sciences BS, suggesting a significant student interest in this distinct Environmental Science major. The target audience will be students interested in resource conservation, land management, working outdoors, "making a difference" in the environment, and students interested in entry level employment immediately following college. Both the West campus and Havasu location have a larger proportion of first generation college students who want to go to work in their field immediately after earning their BS.

## 6. Impact on Other Programs

List other academic units that might be impacted by the proposed program and describe the potential impact (e.g., how the implementation of this program might affect student headcount/enrollment, student recruitment, faculty participation, course content, etc. in other programs). Attach letters of collaboration/support from impacted programs.

Possible impacts on other programs may be that some students choose this major rather than one offered by one of the academic units listed below, but we believe this number will be relatively small because students often have other reasons for wanting to study and stay at campuses other than the West campus. Additional possible unit-specific impacts are highlighted below.

- College of Liberal Arts and Science (CLAS )

The School of Life Sciences (SOLS)'s Biological Sciences B.S. offers a concentration in Conservation Biology and Ecology. This program focuses more at the community and ecosystem levels of ecology, to include biodiversity and natural resource management. It is complementary to the SOLS concentration by being more job-focused, rather than specifically for preparation of students for graduate school. Additionally, the Department of Chemistry and Biochemistry's B.S. in Chemistry offers a concentration in Environmental Chemistry, which focuses on the chemical interactions in the environment. While ecology and chemistry are a component of our proposed Environmental Sciences B.S., it differs by focusing more broadly on both chemistry and biology. Also, the School of Earth and Space Exploration offers a B.A. in Earth and Environmental Studies, which will not focus as heavily on the sciences as our proposed B.S. degree. An email exchange with Associate Dean Paul Lepore outlining how concerns from CLAS have been addressed is provided.

- School of Letters and Sciences

The Applied Biological Sciences program at the Polytechnic Campus offers a B.S. with a concentration in Applied Ecology and Preveterinary Medicine (newly titled "Natural Resource Ecology" as of Fall 2015). This program focuses on wildlife and conservation biology. While wildlife conservation is a component of our proposed Environmental Sciences B.S., it differs by focusing more broadly on conservation of all levels of biology (from microbial to plants to zoology), as well as a broader foundation in natural resources and environmental chemistry. We believe that the proposed program will positively impact SLS by producing a sizable pool of appropriately trained graduates that will likely have interest in pursuing graduate studies in relevant programs in the natural sciences in SLS. We believe a negative impact would be minimal, given that we have a very different pool of students at these two campuses. An email expressing the lack of conflict from program head Chris Martin is provided.

- School of Sustainability

The B.S. in Sustainability is similar in that it covers environmental issues. However, we believe that the proposed program will not overlap with the School of Sustainability as their B.S. focuses much more on systems analysis and the built environments, rather than on the natural sciences as will our B.S. in Environmental Science. It is possible that students may choose between the two programs, and we have tried to clearly define the different focus in the program description to allow students to make an informed decision. A letter from SOS Dean Chris Boone is provided outlining how to avoid these overlaps.

- The Fulton Schools of Engineering - The Polytechnic School

The Dept of Tech Entrepreneurship and Innovation Mgmt offers a B.S. in Environmental and Resource Management, which

focuses on management of natural ecosystems, including waste management, range management, and wildlife management. We believe our program will not heavily influence this program, because our B.S. in Environmental Science does not focus heavily on technology for management, but rather on understanding the workings of the natural environment from both a chemistry and biology standpoint. Graduates from the proposed B.S. will be excellent candidates for the E&RM 4+1 program, increasing enrollment in their masters program. A letter of support from program chair Larry Olson is provided.

## 7. Projected Enrollment

How many new students do you anticipate enrolling in this program each year for the next five years?

5-YEAR PROJECTED ANNUAL ENROLLMENT					
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year (Yr 1 continuing + new entering)	3 <sup>rd</sup> Year (Yr 1 & 2 continuing + new entering)	4 <sup>th</sup> Year (Yrs 1, 2, 3 continuing + new entering)	5 <sup>th</sup> Year (Yrs 1, 2, 3, 4 continuing + new entering)
Number of Students Majoring (Headcount)	25	50	100	175	250

## 8. Accreditation or Licensing Requirements

If applicable, provide the names of the external agencies for accreditation, professional licensing, etc. that guide your curriculum for this program, if any. Describe any requirements for accreditation or licensing.

None

## 9. Faculty & Staff

### A. Current faculty

List the name, rank, highest degree, area of specialization/expertise and estimate of the level of involvement of all current faculties who will teach in the program.

Faculty Member	Rank	Highest Degree	Specialization	Involvement
Dr. Becky Ball	Assistant Professor	Ph.D.	Soil Ecology	Instruction for LSC 322, ENV 201 and 310
Dr. Connie Borrer	Professor	Ph.D.	Statistics	Instruction in STP 226
Dr. Jennifer Broatch	Assistant Professor	Ph.D.	Statistics	Instruction in STP 226
Dr. Thomas Cahill	Associate Professor	Ph.D.	Chemistry	Instruction in CHM 116, 327/328, and 302.
Dr. Lara Ferry	Associate Professor	Ph.D.	Functional Morphology	Instruction in relevant BIO courses
Dr. Jennifer Hackney	Assistant Professor	Ph.D.	Cell Biology	Instruction in BIO 353/354 and LSC 394
Dr. Chad Johnson	Associate Professor	Ph.D.	Ecology	Instruction in BIO 320 and 331, LSC 322
Dr. Pamela Marshall	Associate Professor	Ph.D.	Genetics	Instruction in LSC 347/348
Dr. Beth Polidoro	Assistant Professor	Ph.D.	Environmental Chemistry	Instruction in CHM 113, 302
Dr. Todd Sandrin	Associate Professor	Ph.D.	Microbiology	Instruction in relevant BIO courses
Dr. Susannah Sandrin	Assistant Clinical Professor	Ph.D.	Soil Science	Instruction in ENV 310
Dr. Brian Sullivan	Professor	Ph.D.	Herpetology	Instruction in BIO 474 and 300/301
Dr. Ken Sweat	Senior Lecturer	Ph.D.	Plant Biology	Instruction in relevant BIO and PLB courses
Dr. Carl Wagner	Assistant Professor	Ph.D.	Organic Chemistry	Instruction in CHM 233/234 and 237/238

Lake Havasu location Current Faculty

Faculty Member	Rank	Highest Degree	Specialization	Involvement
Dr. Kerrie Anne Loyd	Lecturer	Ph.D.	Ecology	Instruction in BIO 182, 320, 370, LSC 322, electives
Dr. Doyle Wilson	Senior Lecturer	Ph.D.	Geology	Instruction in ENV 201, GLG 108, ENV 345
Dr. Daryn Stover	Lecturer	Ph.D.	Molecular Bio	Instruction in BIO181, 347, 353, 443
Dr. Sharon Harvey	Senior Lecturer	Ph.D.	Environmental Ethics/Policy	Instruction in IAS 407, 409, 324, SOS 101, ENV 385
Dr. Ryan Nangreave	Lecturer	Ph.D.	Gen and Org. Chem	Instruction in CHM113, 116, 231, 233, 237, 302,303
Dr. David Young	Director	Ph.D.	Botany, Plant Bio	Instruction in PLB 300 and PLB electives
Dr. Scott McIntyre	Senior Lecturer	Ph.D.	Statistics, Psyche	Instruction in STP 226, SB electives
Dr. Raymon Van Der Riet	Assistant Directore	J.D.	Business, Org Leadership	Instructionin OGL electives

**B. New Faculty:**

Describe the new faculty hiring needed during the next three years to sustain the program. List the anticipated hiring schedule and financial sources for supporting the addition of these faculty members.

The degree program can be launched with existing Faculty and Faculty Associate support. As enrollment grows, the Dean of New College and Director of the Lake Havasu location will discuss with the Provost hiring plans that support continued growth of the program.

**C. Administration of the program.**

Explain how the program will be administered for the purposes of admissions, advising, course offerings, etc. Discuss the available staff support.

The program will be administered by the School of Mathematical and Natural Sciences in the New College of Interdisciplinary Arts and Sciences. Admissions will be handled by the usual ASU admissions procedures; there will be no special admission requirements for this program. Advising for this program will be provided by academic advisors in our School (currently, there are three). These advisers currently serve the five majors in our School: Applied Computing, Applied Mathematics, Forensics, Life Sciences, and Statistics. Advising for the new program will be provided by our three current advisers. Teaching schedules and course offerings by semester are determined by the School Director in consultation with the Associate Director, faculty, and advisers. Technology support will be provided by ASU's UTO office and the New College technology support staff.

**10. Resources (necessary to launch and sustain the program)**
**A. Required resources:**

Describe any new resources required for this program's success, such as new support staff, new facilities, new library resources, new technology resources, etc.

No new facilities, library, technology, or support resources will be needed.

**B. Resource acquisition:**

Explain how the resources to support this program will be obtained.



**APPENDIX**  
**OPERATIONAL INFORMATION FOR UNDERGRADUATE PROGRAMS**

(This information is used to populate the Degree Search/catalog website.)

**1. Program Name (Major):** Environmental Science

**2. Program Description** (150 words maximum)

The BS program prepares students to pursue careers in environmental science, including but not limited to positions with federal and state agencies, private consulting firms, nongovernment organizations or academic research environments. The curriculum emphasizes many aspects of biological study, including molecular, organismal and ecosystem biology, backed by a strong foundation in chemistry, statistics and geographic information systems. The program also focuses on written communication and management skills that will prepare graduates for the multifaceted, interdisciplinary aspects of their careers in environmental science.

**3. Contact and Support Information**

Building Name, code and room number: ( <i>Search ASU map</i> )	FAB N115
Program office telephone number: ( <i>i.e. 480/965-2100</i> )	602/543-6050
Program Email Address:	mns@asu.edu
Program Website Address:	http://newcollege.asu.edu/mathematical-natural-sciences-degree-programs

**4. Delivery/Campus Information Delivery:** On-campus only (ground courses and/or iCourses)

*Note: Once students elect a campus or On-line option, students will not be able to move back and forth between the on-campus and the ASU Online options. Approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.*

**5. Campus/Locations:** indicate all locations where this program will be offered.

Downtown Phoenix     Polytechnic     Tempe     West    Other: Lake Havasu City

**6. Additional Program Description Information**

- A. Additional program fee required for this program?    No  
B. Does this program have a second language requirement?    No

**7. 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. (150 words maximum)

Career opportunities for graduates of this program include employment in federal and state agencies (such as the Bureau of Land Management, Environmental Protection Agency, Forest Service, etc.), private consulting firms, and nongovernmental and nonprofit organizations. Graduates of the program will also be well-qualified to pursue graduate studies in relevant areas of the natural sciences.

**8. 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

**9. Keywords**

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

Environmental science, ecology, environment, conservation

**10. Advising Committee Code**

List the existing advising committee code to be associated with this degree.

UGNC02 (proposal form for code submitted Sep 2014)

*Note: If a new advising committee needs to be created, please complete the following form:*

[Proposal to create an undergraduate advising committee](#)

**11. First Required Math Course**

List the first math course required in the major map.

MAT 210: Brief Calculus or MAT 170: Precalculus

**12. WUE Eligible:**

Has a request been submitted to the Provost by the Dean to consider this degree program as eligible for WUE?

Yes

*Note: No action will be taken during the implementation process with regards to WUE until approval is received from the Provost.*

**13. Math Intensity:**

a. List the highest math course required on the major map. (This will not appear on Degree Search.)

MAT 210: Brief Calculus or MAT 170: Precalculus

b. What is the math intensity as indicated by the highest math required on the major map? Math intensity categorization can be found here: <https://catalog.asu.edu/mathintensity>

Moderate

**14. CIP codes**

Identify CIP codes that should be displayed on Degree Search. CIP codes can be found at:

<http://www.onetonline.org/crosswalk/CIP/>.

19-2041.00

19-2043.00

19-2041.01

11-9121.02

19-2041.02

19-1013.00

19-2041.03

19-1031.01

25-1053.00

19-1023.00

Are any specific career codes (SOC/ONET codes) to be omitted from the CIP codes selected above? (i.e. "Omit 25-10312.00 Engineering Teachers, Postsecondary from CIP code 14.0501 Bioengineering and Biomedical Engineering.")

**15. Area(s) of Interest**

A. Select **one (1)** primary area of interest from the list below that applies to this program.

Arts

Business

Communications & Media

Education & Teaching

Engineering & Technology

Environmental Issues & Physical Sciences

[Exploratory](#)

Health & Wellness

Humanities

[Interdisciplinary Studies](#)

Law & Justice

Computing [and Mathematics](#)

[Psychology](#)

[STEM](#)

[Science](#)

Social and Behavioral Sciences

Sustainability

B. Select **one (1)** secondary area of interest from the list below that applies to this program.

- |                          |   |                                     |  |
|--------------------------|---|-------------------------------------|--|
| <input type="checkbox"/> |   | <input type="checkbox"/>            | <b>Humanities</b>                                |
| <input type="checkbox"/> | <b>Arts</b>   | <input type="checkbox"/>            | <a href="#"><u>Interdisciplinary Studies</u></a> |
| <input type="checkbox"/> | <b>Business</b>                                     | <input type="checkbox"/>            | <b>Law &amp; Justice</b>                         |
| <input type="checkbox"/> | <b>Communications &amp; Media</b>                   | <input type="checkbox"/>            | <b>Computing <u>and Mathematics</u></b>          |
| <input type="checkbox"/> | <b>Education &amp; Teaching</b>                     | <input type="checkbox"/>            | <a href="#"><u>Psychology</u></a>                |
| <input type="checkbox"/> | <b>Engineering &amp; Technology</b>                 | <input type="checkbox"/>            | <a href="#"><u>STEM</u></a>                      |
| <input type="checkbox"/> | <b>Environmental Issues &amp; Physical Sciences</b> | <input checked="" type="checkbox"/> | <a href="#"><u>Science</u></a>                   |
| <input type="checkbox"/> | <a href="#"><u>Exploratory</u></a>                  | <input type="checkbox"/>            | <b>Social and Behavioral Sciences</b>            |
| <input type="checkbox"/> | <b>Health &amp; Wellness</b>                        | <input type="checkbox"/>            | <b>Sustainability</b>                            |









The following fields are to be completed by the Office of the Executive Vice President and Provost of the University.

CIP Code: \_\_\_\_\_

Plan Code:

## 2015 - 2016 Major Map Environmental Science, (Proposed)

NVTAWEL

Term 1	0 - 15 Credit Hours	Critical course signified by 	Hours	Minimum Grade	Notes
	BIO 181: General Biology I (SQ)		4	C	<ul style="list-style-type: none"> <li>• An SAT, ACT, Accuplacer, or TOEFL score determines placement into first-year composition courses.</li> <li>• ASU Math Placement Exam score determines placement in Mathematics course.</li> <li>• ASU 101 or College specific equivalent First Year Seminar required of all freshman students.</li> <li>• Either MAT 170 or MAT 210 is acceptable to meet the requirement. MAT 210 is recommended for students intending to pursue graduate degrees.</li> <li>• IAS 300 is required in place of IAS 191 for Transfer students.</li> </ul>
	IAS 191: New College Freshman Seminar		1		
	CHM 113: General Chemistry I (SQ)		4	C	
	ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition		3	C	
	MAT 210: Brief Calculus (MA) OR MAT 170: Precalculus (MA)		3	C	
	Term hours subtotal:		15		
Term 2	16 - 29 Credit Hours	Critical course signified by 	Hours	Minimum Grade	Notes
	BIO 182: General Biology II (SG)		4	C	
	CHM 116: General Chemistry II (SQ)		4	C	
	ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition		3	C	
	STP 226: Elements of Statistics (CS)		3	C	
	Complete ENG 101 or ENG 105 or ENG 107 course(s).				
	Term hours subtotal:		14		
Term 3	30 - 43 Credit Hours	Critical course signified by 	Hours	Minimum Grade	Notes
	ENV 201: Fundamentals of Environmental Science		3	C	<ul style="list-style-type: none"> <li>• One semester of organic chemistry lecture+lab is required, either CHM 231+235 or CHM 233+237. CHM 233+237 should be taken by students intending to take electives from the Chemistry/Toxicology</li> </ul>
	PHY 101: Introduction to Physics (SQ)		4	C	
	CHM 231: Elementary Organic Chemistry (SQ) AND CHM 235: Elementary Organic Chemistry Laboratory (SQ) OR CHM 233: General Organic Chemistry I AND CHM 237: General Organic Chemistry Laboratory I		4	C	
	Social-Behavioral Sciences (SB) AND Cultural Diversity in the U.S. (C)		3		

❖ Complete Mathematics (MA) requirement.

Term hours subtotal: 14

focus area, as they are prerequisites required for many courses in that focus area.

Term 4	44 - 57 Credit Hours	Critical course signified by ❖	Hours	Minimum Grade	Notes
❖	GLG 108: Water Planet (SQ) OR GLG 101: Introduction to Geology I (Physical) (SQ) AND GLG 103: Introduction to Geology I-Laboratory (SQ)		4	C	<ul style="list-style-type: none"> <li>The electives listed at the bottom are grouped by focus areas. Students can take electives from any of the focus areas. Some students may choose to specialize in a particular area, and therefore take all of their electives from within one group. Other students may choose a broad approach and take electives from each group.</li> </ul>
	SOS 111: Sustainable Cities ((HU or SB) & G)		3	C	
	Social-Behavioral Sciences (SB) AND Historical Awareness (H)		3		
	Track Focus Elective Course		4	C	
	Term hours subtotal:		14		

Term 5	58 - 72 Credit Hours	Necessary course signified by ★	Hours	Minimum Grade	Notes
★	CHM 302: Environmental Chemistry		3	C	<ul style="list-style-type: none"> <li>IAS 300 is required for Transfer students.</li> </ul>
	IAS 407: Environmental Philosophy and Policy (L or HU) OR IAS 300: Adult Career Development (L or SB) OR Literacy and Critical Inquiry (L)		3	C	
	LSC 347: Fundamentals of Genetics		3	C	
	PHI 310: Environmental Ethics (HU)		3	C	
	Upper Division Language and Cultures: Requirement satisfied through the following: * Completion of secondary education at a school in which the language of instruction is not English; * Completion of a language course at the intermediate level (202 or equivalent), including American Sign Language IV; * Completion of upper division course(s) taught in a foreign language, taken in the United States or the relevant country; * 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; * Completion of two sequential semesters of coursework in a current computer language.		3	C	
	Term hours subtotal:		15		

Term 6	73 - 87 Credit Hours	Necessary course signified by ★	Hours	Minimum Grade	Notes
★	BIO 320: Fundamentals of Ecology AND LSC 322: Fundamentals of Ecology Laboratory		4	C	<ul style="list-style-type: none"> <li>The electives listed at the bottom are grouped by focus areas. Students can take electives from any of the focus areas. Some students may choose to specialize in a particular area, and therefore take all of their electives from within one group. Other students may choose a</li> </ul>
★	ENV 345: Spatial analysis in the environmental sciences		3	C	
	PLB 300: Plant Diversity and Evolution (L or SG)		4	C	
	Track Focus Elective Course		4	C	
	Term hours subtotal:		15		

broad approach and take  
electives from each group.

<b>Term 7</b> 88 - 103 Credit Hours <b>Necessary course signified by</b> ★	<b>Hours</b>	<b>Minimum Grade</b>	<b>Notes</b>
★ BIO 422: Ecosystem Ecology	3	C	
BIO 370: Vertebrate Zoology or BIO 385: Comparative Invertebrate Zoology	4	C	
LSC 484: Internship or LSC 499: Individualized Instruction or BIO 499: Individualized Instruction or LSC 492: Honors Directed Study or BIO 495: Undergraduate Research	3	Y	
Upper Division Track Focus Elective Course	3	C	
Upper Division Language and Cultures: Requirement satisfied through the following: * Completion of secondary education at a school in which the language of instruction is not English; * Completion of a language course at the intermediate level (202 or equivalent), including American Sign Language IV; * Completion of upper division course(s) taught in a foreign language, taken in the United States or the relevant country; * 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; * Completion of two sequential semesters of coursework in a current computer language.	3	C	
Term hours subtotal:	16		

<b>Term 8</b> 104 - 120 Credit Hours <b>Necessary course signified by</b> ★	<b>Hours</b>	<b>Minimum Grade</b>	<b>Notes</b>
★ ENV 310: Soil Science	4	C	<ul style="list-style-type: none"> <li>The electives listed at the bottom are grouped by focus areas. Students can take electives from any of the focus areas. Some students may choose to specialize in a particular area, and therefore take all of their electives from within one group. Other students may choose a broad approach and take electives from each group.</li> </ul>
★ ENV 385: Environmental Impact Assessment	3	C	
IAS 409: Eco-Community Ethics (HU)	3	C	
Track Focus Elective Course	3	C	
Elective	4	C	
Term hours subtotal:	17		

Organismal/Conservation Biology	Chemistry/Toxicology	Ecosystem/Global Change
BIO 385: Comparative Invertebrate Zoology	BCH 371: Modern Concepts in Biochemistry AND BCH 372: Modern Concepts in Biochemistry Laboratory	BIO 323: Ecosystem Restoration and Management
BIO 370: Vertebrate Zoology	BIO 353: Cell Biology	BIO 412: Conservation in Practice
BIO 331: Animal Behavior	BIO 443: Applied Molecular Genetics and Genomics	BIO 415: Biometry (CS)
BIO 360: Animal Physiology		BIO 421: Landscape Ecology
BIO 410: Techniques in Conservation Biology and Ecology (L)		BIO 426: Limnology (L)

BIO 474: Herpetology

PLB 308: Plant Physiology

PLB 310: The Flora of Arizona

CHM 234: General Organic Chemistry II  
AND CHM 238: General Organic  
Chemistry Laboratory II

CHM 303: Environmental Chemistry  
Laboratory (L)

LSC 375: Analytical Chemistry for Life  
Sciences AND LSC 376: Analytical  
Chemistry for Life Sciences Lab

LSC 475: Toxicology

MIC 443: The Microbial Universe AND  
MIC 444: The Microbial Universe  
Laboratory

LSC 362: The Human Environment

SOS 110: Sustainable World

#### Business/Leadership

OGL 200: Introduction to Organizational  
Leadership (SB)

OGL 240: Introduction to Project  
Management

OGL 300: Theory and Practice of  
Leadership

OGL 355: Leading Organizational  
Innovation and Change (L)

COM 430: Leadership in Group  
Communication

SOS 385: Business & Sustainability I

SOS 311: Future Thinking and Strategies

SOS 230: Professional skills in  
Sustainability

**Total Hours:** 120

**Upper Division Hours:** 45  
minimum

**Major GPA:** 2.00 minimum

**Cumulative GPA:** 2.00  
minimum

**Total hrs at ASU:** 30 minimum

**Hrs Resident Credit for  
Academic Recognition:** 56  
minimum

**Total Community College Hrs:**  
64 maximum

**Total College Residency Hrs:**  
12 minimum

#### General University Requirements Legend

General Studies Core  
Requirements:

- Literacy and Critical Inquiry (L)
- Mathematical Studies (MA)
- Computer/Statistics/Quantitative  
Applications (CS)
- Humanities, Arts and Design  
(HU)
- Social-Behavioral Sciences (SB)
- Natural Science - Quantitative  
(SQ)
- Natural Science - General (SG)

General Studies Awareness  
Requirements:

- Cultural Diversity in the U.S.  
(C)
- Global Awareness (G)
- Historical Awareness (H)

First-Year Composition

General Studies designations listed on the major map are current for the 2015 - 2016 academic year.

**Subject:** RE: impact on ABS from proposed environmental science BS at West  
**From:** Chris Martin <Chris.Martin@asu.edu>  
**Date:** 8/28/2014 3:27 PM  
**To:** Becky Ball <Becky.Ball@asu.edu>

Becky,

I have had our faculty evaluate the proposal. The general consensus is that we will be operating from different pools of students given the lack of juxtaposition between the Poly and West campuses, but you should be aware that we are changing our program BS in Applied Ecology to a BS in Natural Resource Ecology beginning fall 2015.

Chris Martin

Chris A. Martin, Ph.D.,  
Professor and Head  
Science and Mathematics Faculty  
College of Letter and Sciences  
Arizona State University  
<http://www.public.asu.edu/~camartin/>

-----Original Message-----

From: Becky Ball [<mailto:becky.ball@asu.edu>]  
Sent: Friday, August 22, 2014 4:06 PM  
To: Chris Martin  
Subject: Re: impact on ABS from proposed environmental science BS at West

Dear Dr. Martin,

I am following up on an email I sent last week regarding a proposed new environmental science BS that will be offered at the West Campus. The deadline for the proposal is the end of this month, which requests a letter of support from your program. My original email is quoted below, and I am attaching the program proposal and major map for your review.

Please let me know if you need any further information.

Best,  
Becky

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Becky A. Ball, Ph.D.  
Assistant Professor, School of Mathematical and Natural Sciences Senior Sustainability Scientist, Global Institute of Sustainability Barrett Honors Faculty Arizona State University

On 8/13/2014 2:35 PM, Becky Ball wrote:

Dear Dr. Martin,

I'm faculty at the West Campus in the School of Mathematical & Natural Sciences. We are designing a new Environmental Science B.S. degree. We have identified Applied Biological Sciences as a program that might be



impacted by this new degree, particularly the BS in Applied Ecology. Our degree will differ in that it is not going to be focused on wildlife and conservation biology. These are a component of our proposed degree, but it differs by focusing more broadly on all levels of biology, environmental chemistry, and natural resources. While there may be some students that choose our degree program instead of ABS, we believe this number will be relatively small because there are often other reasons students have for staying at a particular campus. The new B.S. degree may increase the pool of appropriately trained graduates with an interest in pursuing graduate studies in ABS, which are not offered at West Campus.

For the proposal document, we are required to include a statement of support from the impacted programs. Would you be willing to send me such a letter? Please let me know if I should contact someone else within SLS. (The proposal requirements are rather vague about who should provide this statement of support.) If you'd prefer I draft one for you to edit and sign, I'm happy to do this.

Thanks for your time,  
Becky

August 22, 2014

Dr. Becky Ball  
Chair, Environmental Science Degree Development Committee  
School of Mathematical and Natural Sciences  
Arizona State University West  
4701 W. Thunderbird Rd.  
Glendale, AZ 85306

Dear Becky,

I have reviewed the curriculum for the proposed B.S. degree in Environmental Science to be offered at ASU West. Your proposed degree program differs from our B.S. in Sustainability by focusing almost entirely on the natural sciences, and we are pleased to see several SOS courses incorporated into the curriculum. We have some concern that your proposed program might draw students away from our B.S., particularly since the majority of our students first identified sustainability as a major after taking an AP "Environmental Science" course in high school. Increasing the number of majors in Sustainability is a priority for President Crow and for me. I feel it is important to make the program differences clear for incoming students. The focus on natural sciences is specified in the program description, but a more specific major name, such as "Environmental & Natural Sciences" or "Natural Sciences of the Environment" would make this more evident.

I look forward to working with your students enrolled in our SOS courses and continuing to increase sustainability education at the West Campus.

Sincerely,



Christopher Boone  
Dean, School of Sustainability  
Arizona State University

18 August 2014

Dr. Becky Ball  
Chair, Environmental Science Degree Development Committee  
School of Mathematical and Natural Sciences  
Arizona State University West  
4701 W. Thunderbird Rd.  
Glendale, AZ 85306

Dear Becky:

I have reviewed the curriculum for the proposed B.S. degree in Environmental Science to be offered at ASU West and I am pleased to offer my support for this proposal. The curriculum is complementary, but does not significantly overlap, with our existing B.S. in Environmental & Resource Management degree and I do not foresee any negative impact on our program. Indeed, students graduating from your new B.S. in Environmental Science would be excellent candidates for a 4+1 articulation agreement with our M.S. in Environmental & Resource Management and I look forward to working with you on this in the future.

Please don't hesitate to contact me if I can be of any help as you establish this degree.

Sincerely,



Larry Olson, Ph.D.  
Associate Professor  
Environmental & Resource Management Program Chair  
Fulton Schools of Engineering  
The Polytechnic School  
Arizona State University

**From:** Paul LePore  
**Sent:** Wednesday, September 10, 2014 8:07 AM  
**To:** Todd Sandrin  
**Cc:** Patrick Kenney; Ferran Garcia-Pichel; Paul LePore  
**Subject:** Move forward -- FOLLOW-UP -- Env. Science degree

Todd,

Based on our conversation and the thoughts you and I shared over the phone, I believe you can move forward on this new degree plan.

PL

**PAUL C. LEPORE, Ph.D.**  
Associate Dean  
**College of Liberal Arts and Sciences**  
Foundation Building, Suite 110

Arizona State University | P.O. Box 876605 | Tempe, Arizona 85287-6605  
480.965.6506 | Fax: 480.965.2110 | e-mail: [paul.lepore@asu.edu](mailto:paul.lepore@asu.edu)

**ASU College of Liberal Arts and Sciences** — *Transforming learning, discovery and lives*

**From:** Paul LePore  
**Sent:** Monday, September 08, 2014 1:35 PM  
**To:** Bertram Jacobs; Lindy Elkins-Tanton ([lelkinst@asu.edu](mailto:lelkinst@asu.edu)) ([lelkinst@asu.edu](mailto:lelkinst@asu.edu)); Elizabeth Wentz  
**Cc:** Ferran Garcia-Pichel; Patrick Kenney; Jenny Smith; Casey Green  
**Subject:** FOLLOW-UP -- Env. Science degree

Dear Lindy, Bert, and Libby,

Ferran spoke with the Dean of New College (Marlene Trompe) and shared with her the concerns raised with New College's proposed new degree in Environmental Science. Those are listed at the end (see **highlighted** section head).

The takeaway from their phone call was that Todd Sandrin (Associate Vice Provost out at West) and I would review the concerns and discuss possible solutions.

The conversation that I had with Todd went well – Todd summarizes what we discussed directly below. I believe we addressed the main points and arrived at what I think are appropriate responses to the concerns shared.

A quick summary (additional details are below in Todd's email to me):

1. Lindy – New College agrees that we should coordinate enrollments to make sure we don't undercut each other with iCourse offerings (specifically GLC 101 and 103).
2. Bert – your take is correct, the degree New College envisions is more vocational in its focus... ASU Colleges at Lake Havasu (which uses New College as its academic umbrella and

implements New College's courses and programs) specifically wants to use this degree to partner with state and federal agencies in the western part of the state.

3. Libby – Todd definitely wants to work with you (and your colleagues) in the development of new or implementation of existing GIS courses (courses that would be appropriate to this program) and would like to begin discussions with you if your school is willing to participate.

Based on my review, I am pretty sure that we can work out the concerns raised.

Happy to hear your thoughts.

PL

**PAUL C. LEPORE, Ph.D.**

Associate Dean

**College of Liberal Arts and Sciences**

Foundation Building, Suite 110

Arizona State University | P.O. Box 876605 | Tempe, Arizona 85287-6605  
480.965.6506 | Fax: 480.965.2110 | e-mail: [paul.lepore@asu.edu](mailto:paul.lepore@asu.edu)

**ASU College of Liberal Arts and Sciences** — *Transforming learning, discovery and lives*

**From:** Todd Sandrin

**Sent:** Monday, September 08, 2014 9:48 AM

**To:** Paul LePore

**Cc:** David Young (Senior VP)

**Subject:** Env. Science degree

Hi Paul,

Thanks so much for taking time on Friday to discuss our proposed BS in Environmental Science degree program.

With regard to the concerns appended below and that we discussed today:

- 1) We are happy to explore whatever abilities we have to limit enrollment in West campus iCourses in GLG 101 and 103 to only West/Havasu campus students.
- 2) We concur that the SOLS concentration is more tailored to prepare students for graduate study in Environmental Science than our proposed degree. Our degree is wonderfully complementary to the SOLS degree program in that it is more job-focused. As we discussed, we constructed the curriculum in close consultation with representatives from state and federal agencies (which we anticipate will employ many of our graduates) including Arizona Game and Fish and BLM.

We will reduce our enrollment projections to 250, per our conversation.

3) We look forward to working with Libby and her faculty to develop a general studies GIS course that meets the needs of students across ASU with diverse academic and professional aspirations. ENV 345 won't be needed for a couple of years, so there is time to develop this course. A hybrid format for the course would be especially beneficial to Lake Havasu students.

Our advisory group, particularly members from the state and federal agencies, suggested that Environmental Science is the most appropriate name for this degree program. In addition, we are aware of several institutions use this term to describe their comparable degree programs.

Again, thanks!  
Todd

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**Todd R. Sandrin, Ph.D.**

*Associate Professor* – School of Mathematical and Natural Sciences

*Associate Dean* – New College | *Director* - NCUIRE

**New College** | **Arizona State University**

(602) 543-6934 | Todd.Sandrin@asu.edu | Lab - <http://sandrin-lab.asu.edu>

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**Here are specific issues from our units:**

1. COURSE CONFLICTS – SESE does not see conflicts with its Earth and Environmental Studies Major since New College is emphasizing a more biological focus. They feel strongly, however, that New College must limit enrollment in their GLG 101/103 iCourse to students from West Campus (the course would be in direct competition with our own well-established GLG 101/103 iCourse offered through SESE).
2. SIGNIFICANT OVERLAP WITH A CURRENT PROGRAM – SOLS feels the new program overlaps substantially with the SOLS conservation biology and ecology concentration on the Tempe campus. Many of the electives for the SOLS major are required courses for the environmental sciences program proposed by New College. The SOLS concentration in conservation biology and ecology serves approximately 140 students at a time; and they believe that the SOLS program will better prepare students for graduate school than the proposed program and thus we are likely to retain students with those interests. The New College program might be ideal for those students who seek a BS in environmental sciences as a terminal degree. However, there will inevitably be overlap between the courses offered at the West campus and the Tempe campus. The description of the proposed program states that ASU West envisions attracting 600 students to this program. They believe this is unlikely and over-optimistic, especially given the small size of the similar program in Tempe; New College's expectations should be adjusted accordingly. If the program on the West campus does in fact

grow to 600 students, SOLS believes this will have a negative impact on the concentration in SOLS on the Tempe campus.

3. COURSE CONFLICTS AND LACK OF SPECIFICITY IN THE FOCUS OF THE DEGREE – SGSUP does not approve of this proposal as written (specifically they have an issue with the course ENV 345). New College is requesting a new course that is currently offered in SGSUP. Moreover, SGSUP has faculty expertise in GIS and remote sensing not considered in New College's proposal (faculty who teach introductory and advanced courses that would meet the needs of this degree program). As is, SGSUP believe this new degree program would negatively impact the number of students in its courses and fails to engage SGSUP faculty. SGSUP also finds the name of the program too generic. As they note, many people major in geography because it represents environmental science. The emphasis on biology, chemistry etc. in the New College proposal is certainly different and should be reflected in the name.