ARIZONA STATE UNIVERSITY

PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE DEGREE PROGRAM

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: **College of Liberal Arts and Sciences**

Department/Division/School: **School of Geographical Sciences and Urban Planning**

Proposing Faculty Group (if applicable)**:**

Is 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)**:** Geographic Information Science

Are any concentrations to be established under this degree program? No, concentrations will not be established.

A separate "Proposal to Establish an Undergraduate Concentration" is required for each concentration.

Is a program fee required? **Yes, a program fee is required.**

Requested effective catalog year? **2014-15**

For deadline dates see: Curriculum Workflow Calendars.

Delivery method: **On-campus only (ground courses and/or iCourses)**

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:

Proposal Contact

Name:	Elizabeth A. Wentz	Title:	Associate Director, Professor
Phone number:	5-7533	Email:	wentz@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 program.

College/School/Division Dean name:

Signature _____ **Date:** / /20

College/School/Division Dean name (if more than one college involved)**:**

Signature _____ **Date:** / /20

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

ARIZONA STATE UNIVERSITY

PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE DEGREE PROGRAM

1. Purpose and Nature of Program

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

The Bachelor of Science in Geographic Information Science will emphasize spatial thinking, spatial databases, geocomputation, exploratory spatial data analysis, spatial optimization, modeling, and geovisualization. Students will learn computational techniques with skill development in geospatial software engineering. The degree addresses an educational gap by training students in advanced computational and analytical skills demanded by research scientists, software companies, and government agencies.

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: Students graduating from the BS in GIS program will demonstrate the ability to utilize specialized software to solve geographic planning, economic, environmental and social problems in a computer environment.

Outcome 2: Students graduating from the BS in GIS program will be able to design and create new software to support geographic problem solving including user interfaces and models.

B. **Assessment**

C. 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)

Measure 1.1

The final project in GIS 311 (Geographic Information Science II) will provide a culminating experience for students in the application and use of GIS software to solve domain-based problems in urban geography, urban planning, environmental science, and economic geography. The final grade on this project will be monitored.

Performance Criterion 1.1

At least 80% of the students will perform at or above a satisfactory level.

Measure 1.2

The final exam in GIS 471 (Geographic Information Analysis) will test student skills on how to apply spatial analysis methods to a variety of problems in geography and urban planning.

Performance Criterion 1.2

At least 80% of the students will perform at or above a satisfactory level.

Measure 2.1

The two midterm test grades in GIS 461 Optimization Fundamentals for Spatial Analysis will emphasize the theoretical and methodological approaches to spatial optimization principles and implementation. Grades on these two midterms will be monitored.

Performance Criterion 2.1

At least 80% of the students will perform at or above a satisfactory level.

Measure 2.2

GIS 322 Spatial Data Structures and Algorithms will require a final project where students implement spatial data structures and create software containing algorithms to access, manipulate, analyze, and display the data.

Performance Criterion 2.2

At least 80% of the students will perform at or above a satisfactory level.

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 BAMM 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
First Year Composition	6
ASU 101 (or Equivalent)	1
General Studies	32
Core/required courses	26
Program specific electives	9
Additional requirements	19
Other; please explain	27
Total	**120**

C. Core/Required Courses.

i. Total required and/or core course credit hours: 26

ii. List the name, prefix, and credit hours for each required/core course for this program
GIS 211 Geographic Information Science I, 4
GIS 220 Mathematical Principles in GIS, 3
GIS 311 Geographic Information Science II, 4
GIS 321 Programming Principles in GIS, 3
GIS 322 Spatial Data Structures and Algorithms, 3
GIS 461 Optimization Fundamentals for Spatial Analysis, 3
GIS 470 Statistics for Geographers, 3
GIS 471 Geographic Information Analysis, 3

D. Program Specific Electives.

i. Total required program elective credit hours:9

ii. List the name, prefix, and credit hours for any program specific electives for this program:
GIS 201 Spatial Thinking, 3

GIS 205 Geographic Information Technologies, 3

GIS 412 Spatial Decision Support Systems, 3

GIS 431 Spatial Databases, 3

GIS 441 Geographics: Interactive and Animated Cartography and Geovisualization, 3

GIS 451 Digital Analysis of Remotely Sensed Data, 3

GIS 462 Location Analysis and Modeling, 3

GIS 472 Spatial Regression Analysis, 3

GPH 111 Introduction to Physical Geography, 4

PUP 190 Sustainable Cities, 3

GCU, GPH, PUP upper division elective

E. Additional Program Requirements (if any):
List and describe any capstone experiences, milestone, and/or additional requirements.
courses required from related areas:

MAT 270 Calculus with Analytic Geometry I, 4

MAT 243 Discrete Mathematical Structures, 3

CSE 110 Principles of Programming with Java (CS), 3

CSE 240 Introduction to Programming Languages, 3

CSE 310 Data Structures and Algorithms, 3

CSE 460 Software Analysis and Design, 3

CSE 463 Introduction to Human Computer Interaction, 3

CSE 470 Computer Graphics, 3

CSE 471 Introduction to Artificial Intelligence, 3

F. Concentrations

i. Are any concentrations to be established under this degree program? **No, concentrations will not be established.** If yes, are concentrations required? (Select One)

ii. List courses & additional requirements for the proposed concentration (s):

Concentration Name	**Total credit hours**	**Core/Required Courses for Concentration** (Prefix, # & Title)	**Total Core credit hours**	**Program Specific Electives** (include course name and prefix)	**Total Elective credit hours**	**Additional Requirements** (i.e. milestones, capstones)

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) GIS

Note: A request for a "New/Change to Prefix Request Form" must be completed for each new prefix required and submitted with this proposal: 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.
GIS 201 Spatial Thinking
GIS 220 Mathematical Principles in GIS
GIS 321 Programming Principles in GIS
GIS 322 Spatial Data Structures and Algorithms
GIS 412 Spatial Decision Support SystemsGIS 431 Spatial Databases
GIS 472 Spatial Regression Analysis

GIS 201 Spatial Thinking
This course will introduce you to "spatial thinking," a cross-disciplinary foundation for geographic information science (the science of dealing with spatial/geographical data, their manipulation, interpretation and use in problem solving), geospatial technologies (the specific technologies underpinning geographic information science) and spatial analysis (the science of solving spatial problems). The focus is on three fundamental aspects of spatial thinking: (1) concepts of space (how you think about space); (2) measurement and representation (how to turn abstract concepts into concrete representations, such as maps); and (3) spatial reasoning (how to solve spatial problems, such as finding a shortest route to a destination, or locating a facility). The primary objective of the course is to develop a sound foundation for more advanced work in geographic information science, including GIS, remote sensing, spatial data analysis and spatial optimization.

GIS 220 Mathematical Principles in GIS
This course will cover mathematical principles for GIScience and spatial analysis.
Calculus, matrices, basic linear algebra will be introduced, as well as introductory aspects of optimization. The objectives of the course include: 1) review basics of math, calculus and linear algebra; 2) introduce optimization approaches; and 3) be capable of applying these methods to structured problems.

GIS 321 Programming Principles in GIS
Contemporary research in analytical geography has placed an increasing demand on the computational skills of its practitioners. The advances in spatial data analysis and geographical modeling have also largely out-paced the capabilities of standard statistical software. At the same time, the multidisciplinary nature of the spatial sciences often translates into the need to deal with disparate data sources, formats and programming languages. As such, students undertaking research are often confronted with a daunting set of tasks that are seldom covered in an integrated fashion in course work. This course is designed to address this situation.

GIS 322 Spatial Data Structures and Algorithms
Introduction to fundamental data structures and algorithms for the integration, management, processing and analysis of geographically referenced data.

GIS 412 Spatial Decision Support Systems
The goal of this class is to design and implement a spatial decision support system.
Design principles will be developed from readings in the Nyerges and Jankowski (2010) textbook. Student groups will be organized into small groups to implement a prototype system using GIS and programming principles.

GIS 431 Spatial Databases
Enabling scientific discovery requires researchers to effectively collect, organize, store and manage large amounts of geospatial data. In the job market, many jobs in government agencies/industry involve the design, development and maintenance of multi-purpose digital spatial database for use by many partners and agencies. This course will provide students with an understanding of modern spatial database design, management and applications. The topics covers data modeling concepts, the relational data model for the storage and retrieval of spatial and non-spatial information. The data retrieval emphasizes the industry-standard query language SQL and Spatial Query Languages.

GIS 472 Spatial Regression Analysis
In this course we will cover statistical and econometric methods specifically geared at dealing with problems of spatial dependence and spatial heterogeneity in cross-sectional data. The main objective of the course is to gain insight into the scope of spatial regression methods, to be able to apply them in an empirical setting, and to properly interpret the results of spatial regression analysis.
While the focus will be on spatial aspects, the types of methods covered have general validity in statistical practice. The course will include topics such as the specification of spatial regression models in order to incorporate spatial dependence and spatial heterogeneity, different estimation methods and specification tests to detect the presence of spatial autocorrelation and spatial heterogeneity. Considerable attention will be paid to the use of open source software tools, including the Python Numpy module for matrix operations, the PySAL Python library for spatial analysis (and its spreg module in particular) and the GeoDaSpace software package.

5. Program Need

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

The new degree addresses an educational gap in the computational focus of GIS. The target audience is students with interests in developing mathematical, statistical, and computer science tools for use in spatial or geographic problem solving. Current degree programs focus on the use of existing tools and software. This program would instead teach students how to develop new tools and software. Students graduating from this program will be positioned to enter graduate school or to work as a programmer/analyst for government agencies or private companies.

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.

The other academic program that might be impacted by the proposed program is The School of Computing, Informatics, and Decison Systems Engineering. They will be affected by GIS students taking their upper division courses. Given complementary course content, some students may elect to change to the BS in GIS major, although we would advise students to earn a double-major. A letter of support is attached to this proposal. The School of Computing, Informatics, and Decision Systems Engineering letter states that the BS in GIS students are welcome to take their courses, but that CSE 310 requires C++ knowledge, which is covered in their course prerequisite, CSE 240. In response, we adjusted our major map (included with this version of the proposal) to include CSE 240 as a required course. Our students now take three programming courses (CSE 110, GIS 321, and CSE 240) prior to taking CSE 310.

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					
	1st Year	**2nd Year** (Yr 1 continuing + new entering)	**3rd Year** (Yr 1 & 2 continuing + new entering)	**4th Year** (Yrs 1, 2, 3 continuing + new entering)	**5th Year** (Yrs 1, 2, 3, 4 continuing + new entering)
Number of Students Majoring (Headcount)	5	10	75	75	75

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.

Luc Anselin, Regents Professor, PhD, GIScience, core instruction

Sergio Rey, Professor, PhD, geocomputation, core instruction

Wenwen Li, Assistant Professor, PhD, geocomputation, core instruction

Alan Murray, Professor, PhD, GIScience, core instruction

Elizabeth Wentz, Professor, PhD, GISience, core instruction

Soe Myint, Associate Professor, PhD, remote sensing, elective instruction
Elizabeth Mack, Assistant Professor, PhD, econometrics, elective instruction
Stephanie Deitrick, Lecturer, PhD, GIScience, elective instruction
Barbara Trapido-Lurie, Academic Professional, MA, cartography, elective instruction

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 current hiring plan for the School includes two positions in GIS/spatial analysis/modeling, one in geography and one in planning. These positions are not additional hires, but replacements of recent faculty resignations. Once recruited, it is anticipated that one of the faculty (geography) will be part of the core instruction of the BS in GIS program and the other part of the elective instruction. Geographic Information Science and spatial analysis is an area of excellence in the School and it is anticipated that once the School moves beyond replacement hiring, additional faculty resources will become available to the GIS 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.

Admissions will be handled through the ASU undergraduate admissions office. Once admitted to ASU, they are free to be admitted to the GIS major. John Duncan Shaeffer and Patricia Strickland will cover all advising duties. This includes discussing with the student course selection, student schedules, enrollment, DARS issues, critical tracking, and graduation requirements. Duncan and Tricia currently advise geography and planning undergraduates in our School. In particular, they advise students pursuing the BS in Geography with the GIS emphasis, the GIS undergraduate certificate, and the GIS minor.

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.

The program will leverage existing resources in the School, especially the two specially equipped GIS laboratory teaching rooms, support staff and supporting software. No new resources are needed.

B. **Resource acquisition:**

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

N/A

ARIZONA STATE UNIVERSITY

PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE DEGREE

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

1. **Program Name (Major):** Geographic Information Science

2. **Program Description** (150 words maximum)
This program focuses on the computational dimension of geographic information system (GIS) technology. Students in the program will learn concepts in spatial thinking, geographic problem solving, mathematical and statistical spatial modeling, and computational principles in GIS. Students will learn to use commercial and open source GIS and related software. Students will also learn to program in more than one programming language (e.g., Java, C++, and Python). These essential programming skills combined with GIS knowledge will form the basis for designing and implementing GIS software.

3. **Contact and Support Information**

Building Name, code and room number: *(Search ASU map)*	COOR, 5th Floor
Program office telephone number: (*i.e. 480/965-2100*)	480/965-7533
Program Email Address:	geoplan@asu.edu
Program Website Address:	http://geoplan.asu.edu

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:

6. **Additional Program Description Information**

A. Additional program fee required for this program? Yes
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 range from private to public sector positions. In the private sector, students may find employment with software development companies such as Esri, Oracle or Google. Job activities will range from designing desktop systems, implementing web and mobile applications, and developing workflow systems. Public sector job activities involve customizing spatial models and systems for local or national agencies, including web or mobile applications, customized desktop systems and project management.

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.)

9. **Keywords**
List all keywords used to search for this program. Keywords should be specific to the proposed program.
GIS, geographic information science, geocomputation

10. Advising Committee Code

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

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 270

12. Western Undergraduate Exchange (WUE) Eligible:

Has a request been submitted to the Provost by the Dean to consider this degree program as eligible for WUE?No

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

13. 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
- ☒ Engineering & Technology
- ☐ Environmental Issues & Physical Science
- ☒ Interdisciplinary Studies
- ☐ Languages & Cultures
- ☐ Law & Justice
- ☒ Social Science, Policies & Issues

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

CIP Code: _____

Plan Code:

ARIZONA STATE UNIVERSITY

2014 - 2015 Major Map
Iagisbs, BS (Proposed)

DUBDMOK

Term 1 0 - 14 Credit Hours **Critical course signified by ◆**	Hours	Minimum Grade	Notes
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	• An SAT, ACT, Accuplacer or TOEFL score determines placement into first-year composition courses. • ASU Math Placement exam score determines placement in Mathematics course. • ASU 101 or College specific equivalent First Year Seminar required of all Freshmen.
◆ MAT 270: Calculus with Analytic Geometry I (MA)	4	C	
LIA 101: Student Success in the College of Liberal Arts and Sciences	1		
Humanities, Fine Arts and Design (HU)	3		
Elective	3		
Term hours subtotal:	14		

Term 2 15 - 30 Credit Hours **Critical course signified by ◆**	Hours	Minimum Grade	Notes
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	
Natural Science - Quantitative (SQ)	4		
Major Related Courses	3-4	C	
Social and Behavioral Sciences (SB)	3		
Cultural Diversity in the U.S. (C)	3		
◆ Complete ENG 101 OR ENG 105 OR ENG 107 course(s).			
Term hours subtotal:	16-17		

Term 3 31 - 46 Credit Hours **Critical course signified by ◆**	Hours	Minimum Grade	Notes
◆ GIS 211: Geographic Information Science I	4	C	
◆ CSE 110: Principles of Programming with Java (CS)	3	C	
Humanities, Fine Arts and Design (HU) AND Historical Awareness (H)	3		
CLAS Science and Society Elective	3	C	
Elective	3		
◆ Complete First-Year Composition requirement.			
Term hours subtotal:	16		

Term 4 47 - 61 Credit Hours **Critical course signified by ◆**	Hours	Minimum Grade	Notes
◆ GIS 220: Mathematical Principles in GIS	3	C	
◆ GIS 311: Geographic Information Science II	4	C	
◆ GIS 321: Programming Principles in GIS	3	C	
◆ MAT 242: Elementary Linear Algebra	2	C	
Lower Division Literacy and Critical Inquiry (L)	3		
Term hours subtotal:	15		

Term 5 62 - 78 Credit Hours **Necessary course signified by ☆**	Hours	Minimum Grade	Notes
☆ GIS 470: Statistics for Geographers	3	C	
Upper Division Humanities, Fine Arts and Design (HU) OR Upper Division Social and Behavioral Sciences (SB)	3		
Natural Science - Quantitative (SQ) OR Natural Science - General (SG)	4		

	Elective	4	
☆	CSE 240: Introduction to Programming Languages	3	C
	Term hours subtotal:	17	

Term 6 79 - 93 Credit Hours **Necessary course signified by** ☆	**Hours**	**Minimum Grade**	**Notes**
☆ GIS 322: Spatial Data Structures and Algorithms	3	C	
☆ GIS 471: Geographic Information Analysis	3	C	
GIS 412: Spatial Decision Support Systems OR GIS 431: Spatial Databases OR GIS 441: Geographics: Interactive and Animated Cartography and Geovisualization OR GIS 451: Digital Analysis of Remotely Sensed Data OR GIS 462: Location Analysis and Modeling OR GIS 472: Spatial Regression Analysis	3	C	
Upper Division CLAS Science and Society Elective	3	C	
Elective	3		
Term hours subtotal:	15		

Term 7 94 - 108 Credit Hours **Necessary course signified by** ☆	**Hours**	**Minimum Grade**	**Notes**
☆ GIS 461: Optimization Fundamentals for Spatial Analysis	3	C	
☆ CSE 310: Data Structures and Algorithms	3	C	
☆ GIS 412: Spatial Decision Support Systems OR GIS 431: Spatial Databases OR GIS 441: Geographics: Interactive and Animated Cartography and Geovisualization OR GIS 451: Digital Analysis of Remotely Sensed Data OR GIS 462: Location Analysis and Modeling OR GIS 472: Spatial Regression Analysis	3	C	
Upper Division Elective	3		
Elective	3		
Term hours subtotal:	15		

Term 8 109 - 120 Credit Hours **Necessary course signified by** ☆	**Hours**	**Minimum Grade**	**Notes**
☆ CSE 460: Software Analysis and Design OR CSE 463: Introduction to Human Computer Interaction OR CSE 470: Computer Graphics OR CSE 471: Introduction to Artificial Intelligence	3	C	
Social and Behavioral Sciences (SB) AND Global Awareness (G)	3		
Upper Division Literacy and Critical Inquiry (L)	3		
Upper Division Elective	3		
Term hours subtotal:	12		

- All students pursuing a B.S. or B.S.P. degree in the College of Liberal Arts and Sciences must complete two courses from the Science and Society list found at https://clas.asu.edu/advising-and-academic-services/science-and-society. At least one of the two courses must be upper division. Students must earn a C or better in the courses, and no more than one of the two can also be used to simultaneously fill a requirement of the major, minor or related area. Science and Society courses cannot also be used to fill the general studies HU, SB, SQ or SG requirements.

Major Related Courses
GPH 111: Introduction to Physical Geography (SQ) or GIS 205: Geographic Information Technologies or GCU 102: Introduction to Human Geography (SB & G) or PUP 190: Sustainable Cities ((HU or SB) & G) AND GCU Upper Division Elective or GPH Upper Division Elective or PUP Upper Division Elective
GIS 201: Spatial Thinking

Total Hours: 120
Upper Division Hours: 45 minimum
Major GPA: 2.00 minimum

General University Requirements Legend

General Studies Core Requirements:

General Studies Awareness Requirements:

- Cultural Diversity in the U.S. (C)

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

- 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)
- Global Awareness (G)
- Historical Awareness (H)

First-Year Composition

General Studies designations listed on the major map are current for the 2014 - 2015 academic year.

school of human evolution & social change
ARIZONA STATE UNIVERSITY

March 25, 2013

TO: Luc Anselin, School of Geographical Sciences and Urban Planning

FROM: Alexandra Brewis Slade

RE: Proposal of BS Degree in Geographic Information Science

Dear Luc,

We have reviewed your proposal to implement a BS degree in Geographic Information Science and the School of Human Evolution and Social Change has no objections.

Yours sincerely,

Alexandra Brewis Slade, PhD.
Director and Professor.

School of Human Evolution and Social Change
an academic unit of the College of Liberal Arts and Sciences
PO Box 872402 Tempe, AZ 85287-2402
(480) 965-6215 Fax: (480) 965-7671
shesc.asu.edu

ASU SCHOOL OF EARTH & SPACE EXPLORATION
ARIZONA STATE UNIVERSITY

COLLEGE OF LIBERAL ARTS AND SCIENCES

P.O. BOX 871404
TEMPE, AZ 85287-1404

(480) 965-5081
FAX: (480)965-8102
sese.asu.edu

27 March 2013

Professor Luc Anselin
Director, School of Geographical Sciences and Urban Planning
Arizona State University

Dear Professor Anselin,

This letter is to attest that the School of Earth and Space Exploration fully supports your School's proposal to establish a new BS degree program in Geographic Information Science. Establishment of this degree and the new courses required to support it will provide excellent new opportunities for ASU students. We are happy to offer our support.

Sincerely yours,

Steven Semken

Steven Semken
Associate Professor
Associate Director for Undergraduate Education
School of Earth and Space Exploration

ARIZONA STATE UNIVERSITY

April 1, 2013

To: Luc Anselin, Elizabeth Wentz, School of Geographical Sciences and Urban Planning

From: Ronald G. Askin, Director, CIDSE

RE: Proposed B.S. in GIS

We have reviewed the proposal for a B.S. in Geographic Information Systems. We believe this proposal is timely and have no objections to creating this degree. We see the degree as being complementary to our GIS track within the B.S. Informatics degree program. While our program focuses on a broad set of computing tools and skills with some exposure to GIS systems, the proposed B.S. in GIS degree provides an avenue for students outside of Engineering to focus on GIS while obtaining the necessary software skills to utilize this information effectively.

With the necessary prerequisites the B.S. GIS students are welcome to take our CSE and CPI courses. We do note one concern however. CSE 310 requires knowledge of C++ to complete assignments and this is prerequisite knowledge for the course. JAVA and Python are not sufficient. CSE 240 provides this C++ background and we believe the B.S. GIS students will either need to take CSE 240 or acquire C++ in another manner before taking CSE 310.

IRA A. FULTON SCHOOLS OF ENGINEERING
School of Computing, Informatics, and Decision Systems Engineering
P.O. Box 878809 Tempe, AZ 85287-8809
(480) 965-3190 http://engineering.asu.edu

esri

April 26, 2013

Elizabeth D. Phillips, Executive Vice President and Provost of the University
Arizona State University
P. O. Box 877805
Tempe, AZ 85287-7805

Dear Provost Phillips:

I am the manager of Esri, a large GIS software development company in the geoscience and mapping field. Our organization supports hundreds of thousands of organizations in mapping and applying geographic information.

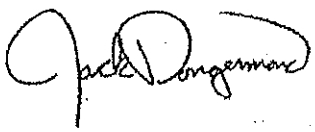
We have a critical need for new employees and are hiring for China, India and other overseas countries but strongly prefer U.S. citizens.

This letter is to support the proposal by the School of Geographical Sciences and Urban Planning for a Bachelor of Science degree in Geographic Information Science (BS in GIS).

The proposed degree includes substantial coursework in computer science and geography, skills needed by public sector employers and private industry (including my company). Presently, graduates from geography programs typically lack advanced computer science skills and graduates from the computer science programs lack the in-depth geography skills. The proposal for a blended program, such as the BS in GIS at ASU, would fulfill this need with graduates with both skill sets.

I would be happy to talk with you further on this subject.

Sincerely,



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