To: Pinky Wassenberg, Dean, College of Public Affairs and Administration  
CPAA College Curriculum Committee

From: Dennis R. Ruez, Jr., Chair, Department of Environmental Studies

Date: 28 January 2011

Re: Proposal to create a Graduate Certificate in Geographic Information Systems; effective date AY 2012-2013 or as soon as possible thereafter

Please find attached the proposal requesting approval to create a new graduate certificate – Geographic Information Systems.

Anyone with interests in capture, storage, analysis, or display of spatial data should have an understanding of Geographic Information Systems (GIS). The skills and methodologies developed within this certificate program are widely applicable, to the extent that the majority of disciplines represented on campus can easily, and productively, incorporate GIS techniques.

We see the potential for using geospatial data even in our daily lives, when we use GPS to find a new restaurant, or when we overlay road maps on satellite images using Google maps, Yahoo! maps, or MapQuest. But there is so much more that can be done using GIS skills. Some of these are hinted at with the new, and free, Business Analyst Online app for the iPhone. GIS is more than producing pretty pictures. This certificate will give students the skills to go to the next level.

Please let me or Yi-Sz Lin know of any questions, either about this certificate proposal or about how you can include GIS in your research.
The attached graduate certificate proposal has been approved by the department. I understand that students cannot be admitted to new graduate certificate programs until the program has received full governance approval and appears in catalog copy.

Dennis R. Ruez, Jr., Chair

Description of Proposed Graduate Certificate Program

Please use the following outline when preparing the certificate proposal, and attach the description to this form before forwarding for required governance approvals.

I. Title of the Proposed Graduate Certificate

II. Mode(s) of Delivery (i.e., on-campus/blended program only; online program only; both)

III. Recommended CIP Code

IV. Purpose of the Proposed Graduate Certificate

V. Target Market/Intended Audience

VI. Occupational/Student Demand

VII. Proposed Curriculum and Anticipated Schedule of Course Offerings for Certificate (please include proposed catalog copy for the certificate program, and note that the minimum number of credit hours is 12 and the maximum number is less than ½ the minimum number of credit hours required for a master's degree)

VIII. Relation to Department's Existing Degree Program

IX. Relation to Professional Accreditation or Professional Association Continuing Education Requirements (if applicable)

X. Certificate Admissions Requirements

XI. Resource Requirements (include staffing, equipment, etc.)

XII. Administrative Issues (i.e., who will provide advising for certificate students, who will track course completion for certificate?)

XIII. Anticipated First Semester/Year for Admitting Students to Certificate Program
Required Governance Approvals

Post-Baccalaureate Graduate Certificate programs require 18 semester hours or more for completion, and must receive the approval of the Academic Department, College Curriculum Committee, Graduate Council, and Campus Senate; be reported to the University of Illinois Board of Trustees; and be listed in the annual listing of the Illinois Board of Higher Education before they can appear in scheduled catalog copy and before a BANNER program code (CERT) can be assigned.

Campus-level Graduate Certificate programs require less than 18 semester hours for completion, and must receive the approval of the Academic Department, College Curriculum Committee, Graduate Council, and Campus Senate before they can appear in scheduled catalog copy and before a BANNER program code (NDEG) can be assigned.

UIS Governance Review Decisions

This is a proposal for a □ Post-Baccalaureate Graduate Certificate □ Campus-level Graduate Certificate. It has been reviewed by the following governance bodies:

College Curriculum Committee □ Proposal Approved □ Proposal Denied

Printed Name of Chair _____________________ Signature of Chair _____________________ Date 2-10-11

Graduate Council □ Proposal Approved □ Proposal Denied

Printed Name of Chair _____________________ Signature of Chair _____________________ Date

Campus Senate □ Resolution Approved □ Resolution Denied

Printed Name of Chair or Designee _____________________ Signature of Chair or Designee _____________________ Date

For Administrative Use Only

For Post-Baccalaureate Certificates (18 or more semester hours)

Senate’s Conference Approval Date: _______________ BOT Approval Date: _______________

Received IBHE acknowledgement for listing on _______________

For ALL Graduate Certificates

Semester/Year of first admission to new Certificate program: _______________

Notices of final approval sent to the following offices on _______________, by ___________________

□ Academic Department Chair □ College Dean □ Assoc Vice Chancellor

□ Registrar □ Asst to AVC (for catalog copy) □ Institutional Research Officer

UIS Graduate Certificate Proposal Form: April 2010 version
Proposal for a Graduate Certificate in Geographic Information Systems
Department of Environmental Studies

I. Title of the Proposed Graduate Certificate
Geographic Information Systems

II. Mode of Delivery
On-campus and online options available.

III. Recommended CIP Code
45.0702 Geographic Information Science and Cartography

IV. Purpose of Certificate
According to Environmental System Research Institute (ESRI), a geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically-referenced information. GIS has become an integral aspect for supporting decision-making in a variety of fields, such as environmental sciences, urban planning/management/policy, political science, civil engineering, business, education administration, real estate, and health care. With its diverse capabilities, the need for GIS in the workplace has increased over the years. In fact, the Bureau Labor of Statistics in 2010 reported that employment opportunities within the mapping and geospatial field are expected to grow faster than the average for all occupations. As a result, competency in GIS will provide UIS students additional future career opportunities and enhance their present positions.

The Graduate Certificate in Geographic Information Systems (GIS) is a 12-hour program administered by the Department of Environmental Studies. The purpose of the certificate is to give students the opportunity to gain valuable GIS knowledge and skills that can be applied to careers in both academia and practice. Upon completion of the certificate coursework, students will be able to

- Describe, distinguish, and apply the fundamental concepts, principles, and tools of geographic information systems (GIS) to understand social, environmental, and economic issues;
- Demonstrate a mastery of basic skills and techniques of using GIS software;
- Identify, describe, diagnose, and offer possible solutions to social, environmental, or economic issues of interest using GIS technology;
- Demonstrate skills to develop and present a concise but effective presentation with geospatial data;
- Demonstrate abilities to work effectively with students from different backgrounds in accomplishing a team project.

V. Target Audience
The certificate is available to degree and non-degree-seeking graduate students who have an interest in learning more about geospatial technologies. Given that GIS can be used in a number of ways, we anticipate interests from students in a variety of academic fields, including, but not limited to, public health, computer science, biology, and environmental studies. Moreover, state agencies frequently use GIS, and actively encourage their employees to participate in GIS
workshops hosted by UIS. By offering the option of completing this certificate entirely online, we will also be able to reach municipalities and counties currently without access to GIS courses via local colleges and universities. Although the online certificate will be available to anyone, regardless of location, our recruitment will focus on Illinois. There are only four current graduate certificate programs in Illinois similar to that proposed here: UIC (Geospatial Analysis and Visualization), Chicago State (GIS), Western Illinois (Environmental GIS), and Roosevelt University (GIS). None of those are available in an online format, meaning that UIS will be uniquely positioned to meet the GIS educational needs for the state. (UIC does offer an online certificate in Public Health Geographic Information Systems, but that program is very focused in scope, and we are unlikely to compete for students. Additionally, six institutions in Illinois offer undergraduate certificates in GIS, but only Elmhurst College offers the courses in an online format.)

E. Occupational/Student Demand
By earning the GIS Certificate, the student can pursue a number of career opportunities with Federal and State agencies, as well as private industries in the following sectors:

- **Local government**
  - planning, zoning, public works (streets, water supply, sewers), garbage collection, and land ownership and valuation

- **State government**
  - natural resource management
  - highways and transportation

- **Businesses**
  - retail site selection and customer analysis
  - logistics: vehicle tracking & routing
  - natural resource exploration (petroleum, etc.)
  - precision agriculture
  - civil engineering and construction

- **Scientific research**
  - geography, geology, botany, ecosystem science
  - anthropology, sociology, economics, political science, epidemiology

The Bureau of Labor Statistics indicated in 2010 that the median annual wages of surveying and mapping technicians were $35,120 in May 2008. The middle 50 percent earned between $27,370 and $45,860. The highest 10 percent earned more than $58,030. Median annual wages of surveying and mapping technicians employed in architectural, engineering, and related services were $33,220 in May 2008, while those employed by local governments had median annual wages of $40,510. In addition, people with GIS certification average about $12,000 more in annual salary than non-GIS-trained people doing the same type of work. The U.S. Department of labor has also identified geospatial technologies as one of the most important emerging and evolving technology areas, and in 2010 Money magazine identified GIS analysts as one of the best jobs in American based on a combination of pay, future job growth, and quality of life. There is a clear demand for employees with GIS skills.
With existing staffing resources, we anticipate being able to accept approximately 10 certificate students per year. Based on informal discussions, we estimate the annual number of applications at approximately 20.

**VII. Proposed Curriculum and Anticipated Schedule of Course Offerings for Certificate**

To earn the Geographic Information Systems (GIS) Certificate, students must take the following required courses, totaling 12 hours:

**ENS 404 Fundamentals of GIS (4 Hours):** Introduction to the concepts and tools of geographic information system and science. Emphasizes basic concepts of design and application of GIS in a variety of fields. Hands-on experience with GIS software. [Offered on-campus in fall semesters and online in spring semesters.]

**ENS 405 Fundamentals of Remote Sensing (4 Hours):** The main objective of this course is to introduce students to the principles and techniques necessary for applying remote sensing to diverse issues in natural resources. The course emphasizes a hands-on learning environment with theoretical and conceptual underpinnings in both aerial and satellite remote sensing. Primary focus will be placed on digital image interpretation, analysis, and processing for a broad range of applications. [Offered online in fall semesters of odd-numbered years. On-campus offerings will be in alternate fall semesters as needed.]

**ENS 503 Advanced GIS Applications in Environmental Planning (4 Hours):** Advanced techniques and applications of geographic information system. Topics covered include GIS data structure, data analysis, GPS data acquisition, geodatabase, GIS modeling, and Geo-statistics. [Offered online in spring of even-numbered years. On-campus offerings will be in alternate spring semesters as needed.]

Proposed catalog copy:

**Graduate Certificate in Geographic Information Systems**  
*This certificate is available both online and on-campus.*

**Contact Information**  
Phone: 217/206-7805  
Email: gis@uis.edu  
Website: uis.edu/gis

The graduate certificate in Geographic Information Systems is designed to provide students with a broad array of geospatial analytical skills which will be applicable to both academic and practice-oriented careers. The certificate can be pursued both by non-degree-seeking students and those formally admitted to a degree program. Courses taken for this certificate may also be applied toward the MS in Environmental Science or the MA in Environmental Studies.

**Entrance and Course Requirements**
Applicants must hold a baccalaureate degree from an accredited institution and meet campus requirements for admission to graduate study. A minimum undergraduate GPA of 3.0 is required for admission. Students not meeting this level may still apply, but will need to write a letter to the GIS Admissions Committee justifying their ability to complete graduate-level coursework (such as having significant work experience in the area). Candidates for the certificate must complete course requirements with a grade of B or better (a grade of B- is not acceptable). Applicants who took an introductory GIS course as an undergraduate, may petition to replace ENS 404 with either ENS 403 or ENS 501.

**Required Courses**

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hrs.</th>
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<tbody>
<tr>
<td>ENS 404</td>
<td>Fundamentals of GIS</td>
<td>4</td>
</tr>
<tr>
<td>ENS 405</td>
<td>Fundamentals of Remote Sensing</td>
<td>4</td>
</tr>
<tr>
<td>ENS 503</td>
<td>Advanced GIS Applications in Environmental Planning</td>
<td>4</td>
</tr>
</tbody>
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**VIII. Relation to Degree Programs**

Currently, all three required courses for the GIS certificate are regularly offered through the Environmental Studies department. Both the Environmental Studies and Public Health departments offer masters degrees for which the two GIS courses are either a concentration core or an elective. ENS 404 is also a required course for the graduate certificate in epidemiology. The recently approved Science of the Environment concentration available to undergraduate majors in Biology and Chemistry includes ENS 404 and 405 as possible courses students can take to satisfy their ‘Techniques’ requirement. Therefore the three courses required for this proposed certificate will continue to be offered, regardless of the success of this proposal.

**IX. Relation to Professional Accreditation or Professional Association Continuing Education Requirements.**

The certificate program outlined here has approximately double the number of student activity hours required to be recognized as a GIS certificate by the GIS Certification Institute (GISCI). Any person holding this certificate and a master’s degree has fully met the education requirements for certification as a GIS Professional from GISCI. Persons with our certificate and only an undergraduate degree can meet the education requirements for GISCI certification with additional formal or informal coursework.

**X. Certificate Admissions Requirements**

Students who wish to pursue this certificate must hold a baccalaureate degree from an accredited institution and meet the campus’ requirements for admission to graduate study. A minimum undergraduate GPA of 3.0 is required for admission. Students not meeting this level may still apply, but will need to write a letter to the GIS Admissions Committee justifying their ability to complete graduate-level coursework (such as having significant work experience in the area.) The GIS Admissions Committee will be chaired by the GIS Laboratory Director and will also include, at minimum, the Chair of the Department of Environmental Studies.

**X. Resource Requirements**

Because the courses required for the certificate in GIS are already being offered regularly, the computing and software requirements are already in place. No additional technology resources are required.
The existing level of course offerings which requires the expertise of the GIS Laboratory Director exceeds his available workload by 1 course per year. Therefore, the Department of Environmental Studies currently uses an adjunct instructor to fill the gap. We anticipate that practice to continue, regardless of the success of this proposal.

In the first two years of the certificate program, we will closely monitor the number of applicants and access the potential for future growth. If empirical data warrant it, we will propose the addition of a full-time clinical instructor position. Addition of that position will 1) better allow us to meet the growing demand for ENS 404 from students from multiple departments; 2) permit the regular offering of ENS 405 and ENS 503 as on-campus courses in addition to the online format; 3) increase the number of undergraduate general education courses (such as Environmental Physical Geography) taught; 4) provide greater flexibility in our core courses in our master’s degrees which would lead to higher enrollment; and 5) increase the ability of the GIS Laboratory to serve as a resource to the campus community. However, until we can clearly document the success of this certificate, we refrain from making this staffing request.

XII. Administrative Issues

1. Responsible Administrative Unit
   - All of the courses are part of the Department Environmental Studies in the College of Public Affairs and Administration. All other administrative obligations will also be covered by Environmental Studies.

2. Admissions
   - The admission decisions will be made by the GIS Admissions Committee, chaired by the Director of the GIS Laboratory.

3. Advising
   - Advising will be provided by the Director of GIS Laboratory and any other faculty who are offering courses for the GIS certificate.

4. Tracking
   - Progress for each student in the GIS certificate program will be tracked by the GIS Admissions Committee to assure progress and completion of the requirements. Additionally, we will monitor the number and diversity of applicants, and the possible impact the certificate program has on the ENS master’s programs (both in terms of number of applications and rate of progress toward degree).

XIII. Anticipated First Semester/Year for Admitting Students to Certificate Program

Fall 2012.