

## Academic Program Approval Voting Record

This document is to be appended as the last page of the proposal for any new or revised academic program to record the successive votes of approval as the proposal moves through its required review and approval steps. Consult Faculty Handbook Section 10.8 or the Faculty Senate Curriculum Committee website for information regarding Committee review and voting requirements for each action.

Curricular Action: (check appropriate boxes below)

1.  New Program       Name Change       Discontinuation       Concurrent Degree for:
2.  Undergraduate Major     Graduate Major     Undergraduate Minor     Graduate Minor  
 Undergraduate Certificate     Graduate Certificate     Other: \_\_\_\_\_
3. Name of Proposed Change: \_\_\_Geographic Information Science Minor\_\_\_\_\_
4. Name of Contact Person: \_\_\_Francis Owusu\_\_\_\_\_ e-mail address: fowusu@iastate.edu\_\_\_
5. Primary College: \_\_\_Design\_\_\_\_\_ Secondary College: \_\_\_\_\_
6. Involved Department(s): \_\_\_CRP; Landscape Architecture; Geological and Atmospheric Science; Natural Resource Ecology and Management; Ecology, Evolution, and Organismal Biology; Ag & Biosystems Engineering; and Agronomy\_\_\_\_\_

### Voting record for this curricular action:

Voting Body	Votes			Date of Vote
	For	Against	Abstain	
Dept. or Program Committee	9	0	0	December 5 <sup>th</sup> , 2015
Computer Curriculum Coordination Committee	9	0	0	February 11 <sup>th</sup> , 2015
College Curriculum Committee	7	0	0	March 27, 2015
College Approval Vote	38	4	0	May 1, 2015
Graduate Council				
Faculty Senate Curriculum Committee	7	0	0	September 29, 2015
Faculty Senate Academic Affairs Council	10	0	0	
Faculty Senate				

# **Proposal for Undergraduate Minor in Geographic Information Science (GIS)**

## **1. Name of the proposed minor.**

Geographic Information Science (GIS) Minor

## **2. Name of the department(s) involved.**

College of Design and the Department of Community and Regional Planning (CRP) will be the main administrative units of the GIS Minor. The following departments have either expressed interest in participating in the GIS Minor or have courses that will be part of the curriculum.

- Community and Regional Planning
- Landscape Architecture
- Geological and Atmospheric Sciences (Geology)
- Natural Resource Ecology and Management (Animal Ecology, Forestry)
- Ecology, Evolution, and Organismal Biology
- Ag & Biosystems Engineering
- Agronomy

This list is expected to grow as more departments and programs become aware of this program and participate in this joint effort.

## **3. Name of contact person(s).**

Francis Owusu, Chair, Department of Community and Regional Planning,  
[fowusu@iastate.edu](mailto:fowusu@iastate.edu); 4-7769

## **4. General description of the minor.**

The program teaches theory, processes, techniques and tools that use spatial data and computational technology to create cutting edge analysis and mapping approaches for urban planning, architecture, landscape architecture, design and community development. GIS is also valuable resource for natural resources, agriculture and environmental sciences as well as a broad range of social scientists, including those in the fields of sociology, criminology, anthropology, political science, and environmental studies.

## **5. Need for the proposed minor.**

The CRP Department and the College of Design currently house the GIS Graduate Certificate program. The graduate certificate program is one of the most successful graduate certificate programs at ISU. As an interdisciplinary program, it provides graduate students from around the university opportunities to use GIS for research, outreach, professional practice, teaching, and, of course, learning. Enrollment in this program, and in the GIS

courses in general, has been increasing as GIS skills have been in high demand for a wide variety of disciplines across the university, and many jobs now have GIS knowledge as required or preferred skill.

Although some undergraduate students have completed the graduate certificate program, there are significant barriers that prevent many more undergraduate students, who would like to acquire GIS expertise and skills, from completing the program. For instance, the independent research requirement of the graduate certificate program is often beyond what many undergraduates can accomplish. In addition, due to course scheduling, undergraduate students have to remain enrolled at least one semester after graduation in order to get the graduate certificate.

The proposed GIS Minor will provide ISU undergraduate students a direct path to acquiring GIS expertise and skills. The program will also leverage existing GIS facilities and resources (faculty and courses) where possible and provide undergraduate students the opportunity to master this important technology. Currently, Introduction to GIS is a 400 level course, which mainly brings in seniors. We feel that is too late in an undergraduate student's program of study to be of significant benefit. It also means that students often don't have enough semesters in a four-year degree to take enough GIS classes to become well-rounded GIS practitioners. They also lose out on the ability to qualify for internal and external internships and summer jobs getting practical experience using GIS and making important contacts for jobs after graduation.

We expect the program to be very popular and attract students from different academic backgrounds who are looking to build more robust research skills and become more marketable. Additionally, programs such as Community and Regional Planning and Landscape Architecture in the College of Design, and other programs around the university, such as Geological and Atmospheric Sciences, Agronomy, Sociology, Anthropology, and Business utilize mapping and GIS technologies. It is expected that students from these disciplines would find GIS Minor essential to expand their primary major.

#### **6. Objectives of the proposed minor including the student learning outcomes and how the learning outcomes will be assessed.**

Graduates will be able to:

- Explain how and why maps can be made to work better for society; what makes a map usable; how maps are created; and how ideas can be presented using state-of-the-art-tools.
- Apply their depth of GIS knowledge to real world situations.
- Conduct spatial analysis and to harness the power of GIS in design and allied disciplines.
- Create maps for multiple media, such as print and digital media.

Learning outcomes would be assessed by lab-based and lecture-based metrics.

### **7. Relationship of the minor to other programs at Iowa State University.**

This program will engage with programs at ISU that utilize mapping, analysis, statistics, GIS, and visual representations such as agronomy, geological and atmospheric sciences, environmental science, environmental studies. It will also be attractive to students from the social science disciplines such as sociology, economics, political science, anthropology, etc. as well as interdisciplinary programs such as global resources, environmental science, and international studies. A minor in GIS will be a very valuable complement to a student's primary major.

The program will also complement and utilize some of the courses that are part of ISU's highly successful graduate GIS certificate program. By doing so, it is hoped that the increased enrollment will ensure courses needed for these programs will continue to be offered regularly, and allow for greater continuity in the curriculum for both programs. In addition to increasing the enrollment limits in some of the existing GIS courses, new GIS courses will also be created to meet the expected increase in demand that will result from the introduction of the minor.

Students who complete the GIS Minor can complete the GIS Graduate Certificate by i) applying and being admitted in the program after completing the bachelors degree with a minimum average GPA of 3.0 in the GIS courses; ii) completing a 3 credit GIS applications project; and iii) participating in 1 credit seminar in GIS applications and Research.

### **8. Relationship of the minor to the strategic plans of the university, of the college, and of department or program.**

The ISU mission, as stated in the 2010-2015 strategic plan, is to 'lead in developing more sustainable ways to produce and deliver safe and nutritious food, water, materials, and energy ... and care for our environment.' GIS is an acknowledged tool used by leading practitioners in every field relating to the areas mentioned above. Another component of the ISU mission is to 'provide exceptional undergraduate ... programs that prepare students for leadership and success.' Creating an undergraduate GIS minor and expanding the GIS course offerings will enhance the education students get at ISU and will provide graduates with a powerful analysis tool that will increase their marketability and make them successful in their chosen careers.

The College of Design's strategic plan also has an overall mission to: 'Educate students to become successful designers, planners, artists, and scholars who will improve the natural, social and built environment.' Again, GIS is a useful analysis tool that is used in many ways to do those specific things. There are also three particular goals of the College of Design that apply to this minor: cultivate interdisciplinary partnerships; improve the quality of educational programs; and broaden access to the college's knowledge, educational offerings and outreach programs.

Working with other departments within the college and across the university to offer a variety of GIS courses as part of the GIS Minor will broaden each student's education and allow for additional students to learn how GIS can be applied in their field.

**9. Comparison of the proposed minor with similar programs at other universities, including the Regent's universities.**

The Department of Geographical and Sustainability Sciences at University of Iowa offers a Minor in GIS. The Department of Geography at the University of Northern Iowa (UNI) also offers a BA in GIS. The ISU proposed program targets students in a variety majors who are interested in acquiring GIS skills. Neither of the programs at the U of Iowa nor the UNI will be available to such students. In addition, this minor will leverage the ISU GIS Support and Research Facility for applied projects and research.

The programs at U of Iowa and UNI, along with U of Minnesota, St. Cloud State, E. Illinois University, U of Missouri and U of WI La Crosse and Stout, were reviewed for content, course timing, credits required, lecture versus lab courses, entry level courses, prerequisites and overall minor goals. This review was very helpful in guiding the makeup of the proposed ISU GIS Minor.

**10. Program requirements and procedures, including:**

**a. prerequisites for prospective students;**

Students must have a minimum overall GPA of 2.0. Some courses have prerequisites, as listed below, which can be waived by the course faculty/department.

**b. application and selection process;**

The GIS Minor will be open to all ISU undergraduate students in with a minimum overall GPA of 2.0 prior to enrolling. To enroll, students should meet with their primary academic adviser to discuss their plan of study and questions regarding prerequisites and then submit a Request for Minor form to the Chair, Community & Regional Planning Department, in the College of Design.

**c. language requirements;**

None

**d. courses and seminars presently available for credit toward the program;**

Students must complete a minimum of 15 undergraduate credits of GIS coursework to receive the Minor.

To meet the 15-credit requirement, students should complete the following GIS coursework:

Foundations of GIS – complete the following two courses (6 credits):

- CRP 251X: Introduction to Geographic Information Systems {3 credits} Fall, Spring, Summer
- CRP 351X: Intermediate Geographic Information Systems {3 credits} Fall, Spring, Summer

GIS Tools and Techniques – choose three courses (9 credits) from the following:

- CRP 452: Geographic Data Management and Planning Analysis {3 credits} Spring
- CRP 454: Fundamentals of Remote Sensing {3 credits} Spring
- CRP 456: GIS Programming and Automation {3 credits} Fall
- CRP 457X: GeoGames for Civic Engagement {3 credits} Spring
- CRP 458: Web Mapping/GIS {3 credits} Fall
- NREM 345: Natural Resource Photogrammetry and Photo-Interpretation {3 credits} Fall
- NREM 546: Integrating GPS and GIS for Natural Resource Management {3 credits} Spring
- GEOL 452: GIS for Geoscientists I {3 credits} Fall
- GEOL 488: GIS for Geoscientists II {3 credits} Spring

As with all university minors, six credits in courses applied to the minor must be numbered 300 and above taken at ISU with a grade of C or higher. The minor must include at least nine credits that are not used to meet any other department, college or university requirement except the credit requirement for graduation.

**e. proposed new courses or modifications of existing courses;**

We currently offer CRP 451 as an introduction to GIS for undergraduate students. This course will be modified and split into CRP 251X and CRP 351X as the gateway courses into the GIS curriculum in general and the GIS minor in particular. Our GIS high impact hire faculty member who joined ISU this Spring, will be proposing additional new GIS courses.

**f. advising of students;**

Students will receive advising support from their primary adviser for their major and GIS advice from the faculty teaching the GIS courses. The GIS faculty will assist students in selecting their elective courses and approve their program of study.

**g. implications for related areas within the university.**

The minor will not significantly impact any other programs within the university. All courses listed in the proposal were contributed by participating departments with an understanding of the potential impact on student enrollment in those courses. The College of Design and the Dept. of Community and Regional Planning have hired a new tenure track high impact hire expressly to increase offerings in GIS courses.

**11. General description of the resources currently available and future resource needs, in terms of:**

**a. faculty members;**

Mixed faculty from the College of Design as well as GIS faculty from across the university. An additional high impact GIS hire in CRP started in spring 2015.

**b. computers, laboratories, and other facilities;**

Current ISU GIS Facility and Design equipment and resources will be a good starting point but the college will need to invest to cover needs that a new mapping program will encounter. The GIS facility will provide the one place on campus that students studying GIS, spatial statistics, remote sensing and global positioning systems can go for their out of class needs.

There are presently two GIS teaching labs dedicated to GIS education in 248 Durham and 526 Design. Several departmental GIS laboratories also exist across campus as well to meet the focused needs of individual departments. These include Natural Resource Ecology and Management, the Center for Transportation Research and Education, Agronomy, Ag and Biosystems Engineering, Civil, Construction and Environmental Engineering, Geological and Atmospheric Sciences and Economics/CARD.

The university participates in an enterprise site license that allows students to load individual copies of our major GIS software to their computers at no cost.

**c. library facilities (journals, documents, etc.) in the proposed area;**

The ISU Library hosts in its collection a wide selection of books and key journals contributing to the GIS field.

**d. supplies, field work, student recruitment, etc.**

The Community and Regional Planning Department and the College of Design as well as the GIS faculty will conduct outreach efforts for student recruitment.

**12. Describe the needs for new resources and/or reallocated resources. Attach to the program proposal memos from the department chair(s), the college dean(s), and other appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources.**

The effects of any new courses on the workload of the present faculty will be minimal as a new GIS faculty was hired this year under the Presidential High Impact Hire.

- 13. Attach to the program proposal, letters of support, recommendations, and statements when appropriate, from programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program.**

See attached.

- 14. If the new program is interdisciplinary, a governance document should be created and submitted to the Associate Provost for Academic Programs. Indicate here that it has been completed.**

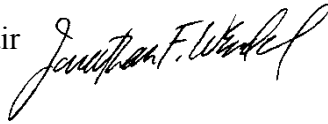
Not applicable



Date: February 10, 2015

To: Francis Owusu, Chair of Community and Regional planning

From: Jonathan F. Wendel, Chair



RE: Proposed GIS minor

I am writing in enthusiastic support of the proposal to create a Geographic Information Science (GIS) minor in the College of Design and the Department of Community and Regional Planning (CRP). This is a long-overdue proposal, as GIS skills are important to a diverse array of students in majors throughout Iowa State University. Closer to my home, a GIS minor will offer our Biology and Environmental Science students with a skill set that is highly valuable in today's world, be their interest in big data, climate change, spatial analysis, and many other topics. About half a dozen EEOB faculty have had students work in the GIS lab, as undergraduates, GIS certificate level students, and graduate students. The more we can build critical mass in this area, the better. This initiative could also help in recruiting both faculty and students alike. As a demonstration of our interest in this area, Bill Crumpton and the ENSCI program created BIOL 370X in part due to unmet needs of Biology and EnSci undergraduates, in this area (see below).

I look forward to the successful establishment of this new minor.

BIOL 370X. GIS for Ecology and Environmental Science. Cr. Var. 1-6. (Same as ENSCI 370X. *Prereq: Six credits in biological and /or physical sciences, and permission of instructor.* Introduction to geographic information systems (GIS) with emphasis on ecological and environmental applications. No prior GIS experience required. Guided, individualized study of topics based on student background and interest. For students with prior experience, topics and activities are selected to build upon any previous experience and minimize duplication to previous GIS coursework. Potential topics include: basic concepts of GIS, data structures, database management, spatial analysis, modeling and visualization of ecological and environmental data. Case studies in ecological and environmental applications using ArcGIS.

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

Department of Geological and  
Atmospheric Sciences  
253 Science Hall I  
Ames, Iowa 50011-3212  
515 294-4477  
FAX 515 294-6049

February 1, 2015

Kevin Kane, Ph.D.  
Associate Dean for Research  
College of Design  
126 College of Design  
Iowa State University  
Ames, Iowa 50011

RE: Undergraduate Minor in Geographic Information Science

Dear Kevin:

The purpose of this letter is to show support of the Department of Geological and Atmospheric Sciences (GeAt) for creation of an Undergraduate Minor in Geographic Information Science (GIS), as proposed by the Department of Community and Regional Planning (CRP). Demand for undergraduate GIS courses has grown campus-wide in recent years and there is a definite need to increase the number and variety of GIS courses available on campus. The increase in campus-wide demand is commensurate with GIS becoming a very important tool for geospatial analysis and visualization of geologic data in recent years. Our department already contributes to these needs by teaching two popular GIS courses, Geol 452 and Geol 488, which will continue to be of interest to CRP and Landscape Architecture students, as well as students in GeAt. We also encourage our students to become proficient in GIS to diversify their education and increase their job marketability.

We do not anticipate any teaching conflicts arising from the creation of the proposed Undergraduate Minor in Geographic Information Science (GIS) and view it as a positive step towards the broadening of GIS offerings on campus. We support the creation of the minor and look forward to having our majors take advantage of it in the near future.

Sincerely,



William W. Simpkins  
Professor and Chair  
Smith Family Foundation Departmental Chair in Geology

# IOWA STATE UNIVERSITY

Office of the Dean

College of Design

Ames, Iowa 50011-3091

515 294-7428

FAX 515 294-9755

E-mail [isucod@iastate.edu](mailto:isucod@iastate.edu)

<http://www.design.iastate.edu>

February 12, 2015

Francis Owusu  
Chair, Dept. of Community and Regional Planning  
College of Design  
146 College of Design  
Iowa State University  
Ames, Iowa 50011

RE: Undergraduate Minor in Geographic Information Science

Chair Owusu,

As director of the Iowa State University Geographic Information Systems Support and Research Facility, I am writing to extend my full support to the proposed undergraduate minor in Geographic Information Science (GIS).

Since my arrival at ISU in 1997, we have been working toward advancing GIS out of the research lab and into the curriculum. Without a geography program at the university, this has not been an easy task. As the technology has become more ubiquitous, the tools have progressively transferred from the research faculty, to graduate students, until now when it is in great demand at the undergraduate level. Iowa State has kept pace by providing the graduate GIS Certificate program to graduate students but there has been an academic gap at the undergraduate level. The proposed GIS minor will fit that need nicely and the department of Community and Regional Planning will be the perfect hub to bring together a broad group of students from across the university.

As you know, the ISU GIS Facility will benefit greatly by enlarging the academic pool of students studying GIS at the university. I look forward to working closely with you to implement the minor in GIS and in making it a major success.

Sincerely



Kevin Kane  
Associate Dean for Research, College of Design  
Director, ISU GIS Facility



4 February 2015

Dr. Francis Owusu, Chair  
Dept. of Community and Regional Planning  
Iowa State University

Dear Dr. Owusu,

The Biology Program Committee, representing the interdepartmental Biology major offered by the Department of Ecology, Evolution, and Organismal Biology and the Department of Genetics, Development, and Cell Biology, recently reviewed your proposal for an undergraduate minor in Geographic Information Science (GIS).

We have had substantial interest by students in the GIS course offered by Biology (Biol 370). Many of our students majoring in Biology are moving into careers in which some knowledge of GIS is now expected; yet their opportunities for exposure to GIS at ISU have been rather limited. This minor should substantially enhance the course programs of our students by increasing the opportunities for students to learn about GIS. GIS is currently being applied to a very large variety of problems in many disciplines, and usage continues to increase, so we believe this minor will also be of wide interest across the university.

Thus, we are very pleased to endorse your proposal for a GIS minor at ISU, and we look forward to its timely implementation.

Respectfully,

A handwritten signature in blue ink that reads 'Thomas W. Jurik'. The signature is written in a cursive, flowing style.

Thomas W. Jurik  
Chair  
Biology Program Committee

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

Department of Sociology  
103 East Hall  
Ames, Iowa 50011-1070  
515-294-6480  
FAX 515-294-2303

February 11, 2015

Kevin Kane  
Associate Dean for Research  
126 College of Design

Dear Professor Kane,

I am writing in support of the creation of a GIS minor in the Department of Community and Regional Planning. There is a growing demand for a minor in GIS from students across the university. For our students who have taken the GIS course work it would have been beneficial if the GIS course work had been listed as a GIS minor. The proposed curriculum will add to their credentials. We strongly support this proposal.

Sincerely,



Paul Lasley, Chair  
Departments of Anthropology and Sociology

## **Kane, Kevin L [DSN]**

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**From:** Blodgett, Sue [ENT]  
**Sent:** Thursday, February 05, 2015 11:28 AM  
**To:** Kane, Kevin L [DSN]  
**Subject:** GIS Minor Proposal - Letter of Support

Dear Kevin,

I have reviewed and visited with the faculty about the proposed GIS Minor proposed by the Department of Community and Regional Planning. GIS skills are becoming increasingly important to both our graduate and undergraduate students. The GIS minor provides a venue for our undergraduate students to acquire GIS expertise and skills. Employers of our students have indicated that they value GIS training that students bring to employment in the private and public sectors. The Department of Natural Resource Ecology and Management supports the GIS Minor that you have proposed. While we offer courses in GIS, your approach offers a minor that allows students to gain more expertise in this important area. GIS has increasingly become an important skill for our students' career success and the proposed minor addresses an unmet need for our students.

Sue Blodgett, Chair  
Department of Entomology  
Department of Natural Resource Ecology and Management  
339 Science II

**Iowa State University**

Ames, IA 50010

(515) 294-1739

[sblodg@iastate.edu](mailto:sblodg@iastate.edu)

To Francis Owusu, Ph D., Professor and Chair  
Department of Community & Regional Planning

From Ken McCown, Chair, Department of Landscape Architecture

Date February 15, 2015

Re Department of Landscape Architecture Letter of Support for CRP GIS minor

It is a pleasure to write this letter of support for the Department of Community and Regional Planning's proposal for an undergraduate minor in Geographic Information Science (GIS). This minor is timely, relevant and will likely benefit the College and Department. GIS is increasingly used to map resources. Planning, with its mission to connect people equitably to information about resources, will be a great home to provide theory to help students understand how to use the GIS tool.

This minor will help our undergraduate students gain access to a type of certification in GIS. Our students already take courses in GIS. This minor will help our students interested in GIS as a tool for landscape architecture by enhancing and diversifying their skill sets. This diversification and minor will enable them to be more viable in the job market.

We will be delighted to co-list courses in GIS taught by our faculty and look forward to assisting planning with the development of this minor as it is in our power to do so.

Sincerely,



Ken McCown, ASLA, Associate AIA, President, CELA  
Professor/Chair  
College of Design/Department of Landscape Architecture  
Iowa State University

**Subject:** GIS Minor

**Date:** Tuesday, May 5, 2015 at 12:43:49 PM Central Daylight Time

**From:** Knapp, Allen D [AGRON]

**To:** Owusu, Francis Y [C R P]

**CC:** Kane, Kevin L [DSN], CALS Curriculum Chair AGLS [AN S], Lamkey, Kendall R [AGRON]

Francis:

We were introduced to the GIS Minor proposal by Dr. Curtis Youngs (Chair, CALS Curriculum Committee).

The Agronomy Department Curriculum Committee has reviewed the proposal and voted unanimously to support the GIS minor. Further we would like to be added to the list of participating departments. As you mention in the proposal, this minor addresses critical issues across an array of disciplines. Our department is in the process of interviewing candidates for a new Soil Informatics position and it is very likely that person will have the responsibility for developing courses that we envision could be offered as part of the GIS Minor.

If you need anything else, please let me know.

Best Regards,  
Allen

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Allen D. Knapp, Professor  
Associate Chair  
Chair, Agronomy Curriculum Committee  
1301 Agronomy Hall  
Agronomy Department  
Iowa State University  
Ames, Iowa 50011  
PH: 515.294.9830



**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

College of Liberal Arts and Sciences  
Department of Computer Science  
226 Atanasoff Hall  
Ames, Iowa 50011-1041  
515 294-4377  
FAX 515 294-0258  
Internet: [www.cs.iastate.edu](http://www.cs.iastate.edu)

**Date:** 4/8/15

**To:** Mark J Childister  
Associate Dean, College of Design  
134 Design Building

**From:** Computer Science Department (Chair Gianfranco Ciardo)

**Re:** Minor in Geographical Information Systems

The Department of Computer Science is gratified to learn about your plans to offer a Minor in Geographical Information Systems. This is a welcome initiative and our department fully supports your efforts.



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Gianfranco Ciardo  
Chair of the Department of Computer Science