

**Proposal for Revision to the  
Geographic Information Systems (GIS) Academic Certificate  
Community College of Philadelphia**

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## **I. Abstract**

This revision is designed to refine and strengthen the GIS Program by addressing changes in the profession and in the educational needs of students. In particular, it emphasizes the streamlining of coursework. The following summarizes the proposed changes:

1. Eliminate one highly specialized course from the curriculum (Spatial Analysis and Mapping in GIS-GIS 103) that would be more appropriate for the graduate level.
2. Combine two similar GIS courses (Applications in Global Positioning Systems Technology, GIS 203 and Remote Sensing, GIS 204). GIS 204 will be subsumed into GIS 203 which will include an introduction to the topics currently planned for GIS 204. (GIS 204 has not been developed.)
3. Add a requirement for graduation that students must earn a 'C' or better in all GIS courses.
4. Remove English 112-Report and Technical Writing from the Certificate.

These changes will reduce the number of credits needed for graduation from 36 to 30.

## **II. OVERVIEW OF THE EXISTING PROGRAM**

Along with general education, the GIS Program provides students with the knowledge and practical skills necessary to develop and manage geographic information projects and to interpret and to apply GIS technology to spatial problems. The current curriculum was created by a non-GIS professional when there were few academic models available. At that time it was believed that the existing requirements were needed to provide a thorough theoretical base to enable a student to enter the field. Since the adoption of the original curriculum, the Program has cultivated connections with GIS professionals and has developed experience with students interested in GIS. The current GIS Academic Certificate requires the completion of twenty-one credits in GIS courses. Thirty-six credits are required for the Academic Certificate.

## **III. DESCRIPTION OF PROPOSED REVISION**

This proposed revision continues to meet the Student Learning Outcomes of the current curricula (See Appendix A Curriculum Map). Advisory Board members and other experts in the field have expressed the opinion that students can be well prepared for the workplace with a reduction in the number of GIS courses. In summary, the curriculum was originally developed based on information available at that time in a rapidly emerging field. This revision is the result of actual experience in working with professionals in the field and assisting potential students. The overall goal of this revision is to reduce the number of GIS courses and reduce the number of total credits required for the Certificate while continuing to provide students with a firm grounding in the discipline.

### Description of Proposed Changes:

This revision consists of four changes to the curriculum:

1. Elimination of one highly specialized course: Spatial Analysis and Mapping in GIS--GIS 103

When the GIS Certificate was originally developed, it included one proposed course that is especially advanced: Spatial Analysis GIS 103.

At other institutions, Spatial Analysis is typically an upper-level undergraduate or graduate-level course. Penn State for example offers Spatial Analysis I (GEOG 454) and Demography and Spatial Analysis (DEMOG 597); while West Chester University offers Geographical Analysis (GEO 326) for undergraduate students and GIS Spatial Data Analysis (GEO 534) for graduate students. The University of Pennsylvania offers three courses in Spatial Analysis, all at the graduate level (CPLN 667: Introduction to Spatial Analysis and Modeling, CPLN 646: Spatial Analysis for Public Health, ESE 502: Advanced Spatial Analysis). Temple University has Spatial Analysis Techniques/Geographic Information Systems (GIS 413) at their Ambler Campus.

A review of GIS degree requirements at nine two year institutions further supports this conclusion (See Appendix B). Of those reviewed, only one includes a course in spatial analysis. (That program at Cayuga Community College in New York includes a total of six GIS courses in its degree – considerably less than CCP’s current requirements.).

Finally, a survey of the GIS Advisory Board members resulted in the unanimous agreement that the current course is too advanced for the associate degree level.

The GIS curriculum will continue to include GIS 102, in which the ArcGIS extension Spatial Analyst is introduced at a level of depth which is sufficient for an Academic Certificate.

## 2. Elimination of GIS 204

The original curriculum provided for a separate course for Global Position Systems (GPS), GIS 203, and another for Remote Sensing (RS), GIS 204. However, offering a separate course for each of these technical topics would mean too much specialization at the associate degree level. Other colleges address these topics in upper division undergraduate courses. For instance, at Penn State, the remote sensing classes are offered at the upper-level undergraduate or graduate-level (Image Analysis (GEOG 352), Advanced Remote Sensing (GEOG 497), Remote Sensing and Spatial Data Handling (FOR 455), and Multispectral Remote Sensing (FOR 555) with no course in GPS. RS is introduced at West Chester University within their course Introduction to Maps and Remote Sensing (GEO 225) and studied further in their graduate course Maps and Aerial Photographs (GEO 507). West Chester University does not have a separate course in GPS. Temple University and the University of Pennsylvania do not offer specific courses in GPS or RS.

Other two-year programs such as that at the Community College of Baltimore County in Maryland offer a combined course, Remote Sensing and Global Position Systems for GIS (GEOA 150), and this appears to be the most effective model for CCP to follow. The revised GIS 203 will provide students with an introduction to the topics which were originally planned to be explored in GIS 204.

3. Add a requirement for graduation that students must earn a ‘C’ or better in all GIS courses.

A new graduation requirement has been added. Students must earn a 'C' or better in all GIS courses. The five GIS courses that remain in the program all teach critical skills that are necessary to be a competent GIS technician. A grade of C is the minimum grade that indicates mastery of the skills needed to be a GIS technician.

4. Remove English 112-Report and Technical Writing from the Certificate.

Students in the GIS Academic Certificate are likely to transfer into the GIS degree program or another degree program. ENGL 112 does not fulfill the College's Information Literacy requirement. Students who take ENGL 112 in the Certificate Program would then need to take ENGL 102 in the degree Program.

#### **IV. EFFECTS OF THE REVISIONS**

##### Program Coherence and Impact on Students:

The proposed GIS curriculum is a coherent curriculum built around understandings of the field and the academic and professional needs of both students and employers. The changes being proposed continue in the spirit of providing a well-rounded experience.

##### Effect upon Graduation Requirements

This revision will reduce the minimum number of credits needed for graduation from 36 to 30.

This revision will require no additional budget, personnel, or College support structure and resources and will affect other departments and curricula only in that students will have the opportunity to take more courses outside of GIS.

#### **V. CATALOG DESCRIPTION**

GIS is a computerized database management system for capture, storage, retrieval, analysis and display of geographic information.

The GIS Certificate Program will provide students with the knowledge and practical skills necessary to develop and manage Geographic Information projects and to interpret and implement GIS as a decision support system.

The core sequence of five GIS courses is offered which will enable students to

1) develop substantial theoretical and practical competencies relating to GIS; 2) develop foundational understanding and skills in the use of industry standard software; and 3) be able to demonstrate to employers the ability to perform GIS tasks at the entry level.

Students completing the Geographic Information Systems Certificate Program will be well

prepared to enter the field of GIS in a public or private environment as entry-level GIS technicians. Individuals currently working in this or a related field will substantially enhance their knowledge and skills.

***Student Learning Outcomes:***

Upon completion of this program graduates will be able to:

- Identify how geospatial technologies can be utilized within various organizations/applications.
- Identify necessary equipment (software and hardware) and data needed to complete project.
- Effectively use various geospatial technologies (Geographic Information Systems/GIS, Global Positioning Systems/GPS).
- Conduct geospatial analyses (geocoding, buffer, clip, distribution, correlation and network).
- Work productively both independently and in teams on geospatial projects.

***Program Entry Requirements:***

New students are required to take College placement tests. Students identified as needing developmental course work must satisfactorily complete the appropriate English and mathematics courses in addition to the requirements of the Program.

***Program of Study and Graduation Requirements:***

To qualify for the Academic Certificate in Geographic Information Systems, students must complete the appropriate 30 credit hours with a minimum cumulative grade point average of 2.0 (C average). All students must earn a C or better in all GIS courses.

Course Number and Name	Prerequisites and Corequisites	Credits
<b>SUMMER</b>		
CIS 103 – Applied Computer Technology		3
GIS 101 – Introduction to GIS	CIS 103, which may be taken concurrently	3
<b>FIRST SEMESTER</b>		
GEOG 101 – Introduction to Physical Geography or GEOG 103 – Cultural Geography		3
ENGL 101 – English Composition I		3
MATH 118 – Intermediate Algebra or higher		3
GIS 102 - Intermediate GIS	GIS 101	3
<b>SECOND SEMESTER</b>		
ENGL 102 – English Composition II	ENGL 101	3
GIS 104 - Principles of Computer Cartography and Visualization	GIS 101	3
GIS 201 - Advanced GIS Systems	GIS 102	3
<b>SUMMER OR THIRD SEMESTER</b>		
GIS 203 - Applications in Global Positioning Systems (GPS) Technology	GIS 201	3
<b>MINIMUM CREDITS NEEDED TO GRADUATE</b>		<b>30</b>

## Appendix A—Curriculum Map

Course	Student Learning Outcomes				
	Identify how geospatial technologies can be used with various organizations and applications	Identify necessary equipment (software and hardware) and data needed to complete projects.	Effectively use various geospatial technologies	Conduct Geospatial analyses (geocoding, buffer, clip, distribution, correlations and networking)	Work productively both independently and in teams on geospatial projects
GIS 101 Introduction to GIS	Introduced	Introduced	Introduced	Introduced	Introduced
GIS 102 Intermediate GIS	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
GIS 104 Principles of Computer Cartography and Visualization			Intermediate		Mastery
GIS 201 Advanced Geospatial Applications	Mastery	Mastery	Mastery	Mastery	Mastery
GIS 203 Remote Sensing and Global Positioning Systems	Mastery	Mastery	Mastery	Mastery	Mastery

Please note that assessment evidence is obtained for each level of competency.

## Appendix B

The Urban and Regional Information Systems Association (URISA) is a nonprofit association of professionals using Geographic Information Systems (GIS) and other information technologies to solve challenges in state/provincial, regional and local government agencies and departments. URISA's website (<http://www.urisa.org/career/colleges>) includes a table of post-secondary courses. (CCP's degree is included.) The links at that site were used to explore the current status of the GIS two year degrees listed there and the information on the table below was gathered from the URISA website and the websites of the colleges listed.

Two-year GIS degrees				
Institution	Degree	Credits in Major /Total Credits for Degree	Notes	Course in Spatial Analysis?
Anoka Ramsey Community College (MN)	A.S	18 credits in major  62-63 total credits for degree	Four courses (12 credits) in GIS  Three courses (7 credits) in Geography	No
Baltimore Community College (MD)	A.A.S.	12 credits in Major 66	Four courses (12 credits in GIS)	No
Bismarck State Community College (ND)	A.A.S.	25 credits in major  62 total credits for degree	Seven courses (21 credits) in GIS  One course (4 credits) in Geography	No
Brevard Community College (FL)	No degree listed		Four courses in GIS offered	No
Cayuga Community College (NY)	A.S.	18 credits in major 55—57 total credits	Six courses (18 credits) in GIS	Yes
Gray Harbor College (WA)			One three credit GIS course offered as an elective	No
Green River Community College (WA)	A.A.S.	21 credits in major 101-106 total credits for degree * Quarter System	Five courses (21 credits) in GIS	No
Harrisburg Area Community College (PA)	A.A.S.	30 credits in major  67 total credits	Six courses (18 credits) in GIS  Five courses (5 credits total) in CAD  One course (4 credits) in Engineering	No
San Jacinto College (CA)	A.S.	18 credits in major 63 total credits	All major courses are listed as "geography" courses; one course provides an introduction to cartography; all other major courses relate to GIS topics	No