

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA
ACADEMIC SENATE

ACADEMIC PROGRAMS COMMITTEE
REPORT TO
THE ACADEMIC SENATE
AP-009-167

BS IN GEOGRAPHY – GEOSPATIAL ANALYSIS OPTION

Academic Programs Committee

Date: 11/02/2016

Executive Committee
Received and Forwarded

Date: 11/16/2016

Academic Senate

Date: 11/30/2016
First Reading
01/11/17
Second Reading

BACKGROUND: The Department of Geography and Anthropology has proposed to change an option name from “BS in Geography– Geographical Information Systems Option” to “BS in Geography – Geospatial Analysis Option” for semesters. This is a directly converted option, the referral is for name change only.

The department proposed this name change to reflect the evolving terminology of the field. When the option was first designed in the 1990’s the focus of the field was on the hardware and software used to collect geographic information and for map making. However, since then the curriculum has evolved to reflect the changing nature of the field, and the current curriculum now places greater emphasis on using and interpreting many types of geographic information of natural and societal relevance. Professional terminology reflects this shift, with “Geospatial Analyst” being a common job title according to the Geography and Anthropology faculty, and a consortium in the CSU system publishes an annual newsletter titled “CSU Geospatial Review.”¹ In light of these factors, the Geography and Anthropology Department proposes that the name of the option be updated to reflect professional practice and the current curriculum.

RESOURCES CONSULTED:

Deans
Associate Deans
Department Chairs
All Faculty

DISCUSSION:

Before reaching the Academic Programs Committee, this program was reviewed by the College Curriculum Committee in the College of Letters Arts and Social Sciences as well as the Dean of CLASS and the Office of Academic Programs. All concerns raised at those levels were addressed. The Academic Programs Committee then conducted campus-wide consultation, as well as its own review of the program.

In this campus-wide consultation, a key objection was raised by the Civil Engineering Department, which offers an option in Geospatial Engineering. The full text of their statement offered in objection is included below, but the essence is that they are concerned that the similarity of the names may create confusion in the minds of students and employers. In particular, they feel that since the term “Geospatial” is applied to many interrelated types of work, all of which involve various types of analytical thinking and data analysis, the name “Geospatial Analysis Option” is overly broad.

The AP Committee invited a response from the faculty of the Geography and Anthropology Department (included below) and then invited representatives from both departments (Xudong Jia, Chair of Civil Engineering, Omar Mora, Assistant Professor of Civil Engineering, Michael Reibel, Chair of Geography and Anthropology, and Lin Wu, Professor of Geography) to discuss the matter with the committee.

¹ http://csugis.sfsu.edu/CSU_Geospatial_Review/CSU_GeospatialReview.htm

After considering the arguments of both sides, the AP Committee feels that this name change will not cause confusion in the minds of students and employers. The full names of the programs are “Bachelor of Science in Civil Engineering—Option in Geospatial Engineering” and “Bachelor of Science in Geography—Option in Geospatial Analysis.” While faculty from both departments admit that there are areas of common interest between the people in those fields, the degree options are identified by more than just the term “Geospatial.” It is clear that the Geospatial Engineering program is under the umbrella of Civil Engineering, and that a student who pursues the Geospatial Engineering Option will have taken a broad range of courses that covers more Civil Engineering subfields than just Geospatial Engineering. Likewise, it is clear from the full name that the Geospatial Analysis Option is under the umbrella of Geography, a field that combines perspectives of the natural sciences and social sciences. The full names of the programs communicate meaningful and important differences in perspective, skill set, and intellectual emphasis.

Moreover, the common terminology at issue is not a core disciplinary designator, but rather a term that often shows up in interdisciplinary contexts (“geospatial”). It is the opinion of the Academic Programs Committee that interdisciplinary fields offer promising opportunities for our students, and programs that help students to develop skills with interdisciplinary relevance should be allowed to identify as such, provided that the full program name also communicates distinctions from other programs on campus. To the extent that there are areas of common interest between the Geospatial Analysis Option and the Geospatial Engineering Option, the best path forward for everyone on campus is that these departments find productive ways to collaborate on projects with real-world relevance to students, and take full advantage of the differences in perspective between Geographers and Civil Engineers.

RECOMMENDATION:

The Academic Programs Committee recommends—by an 11 to 1 vote--changing the option name from “BS in Geography – Geographic Information Systems Option” to “BS in Geography – Geospatial Analysis Option” for semesters.

SUPPLEMENTARY INFORMATION:

Feedback from Civil Engineering (pages 4-8)

Response from Geography and Anthropology (pages 9-10)

(Response from Geography and Anthropology, Received October 21, 2016)

In response to the name change of Geography Department's Geographical Information Systems (GIS) Option to Geospatial Analysis Option, here are the comments from the Civil Engineering Department, and more specifically the faculty from the Geospatial Engineering Option technical area of expertise.

1. **Name Conflict**

Since 1986, the Civil Engineering (CE) Department has had an option covering the Geospatial/Geomatics/Surveying technical areas of expertise. The option was originally named Surveying option and it has been renamed **Geospatial Option since 2005**. The name change was based on the high accuracy data collection, processing and geospatial analysis covered by the program. The College of Engineering has a Geospatial Engineering Laboratory in building 17, room 1671. The Geography and Anthropology department's option name change from the current Geographical Information Systems (GIS) option to Geospatial Analysis Option would be a **name duplication** and would send a **misleading and confusing message to students and employers**.

A comparison between the two options in quarter and proposed to semester is presented below, to justify the differences between the programs, and how the word **Geospatial has been part of the CE Geospatial Option** and technical area for over a decade at Cal Poly Pomona.

2. **Summary of conversation with Todd Johanesen, Director, NGA**

Todd Johanesen is the Director of the Office of Sciences & Methodologies (Analysis Directorate) of the National Geospatial-Intelligence Agency (NGA). He was on campus on October 6th, 2016, as a keynote speaker for the 2016 CPP Geomatics Conference. In his presentation, he presented the NGA, history, areas of work, mission, role in national security, etc. One of the segments of his address was on the NGA recruitment efforts. NGA recruits from all areas of knowledge, including social sciences, sciences, and engineering. He specifically mentioned the difference between GIS graduates from Social Sciences, and Geospatial engineers and scientist with a deeper knowledge of accuracy of data collection and manipulation. The conversation with geospatial engineering industry and faculty continued after his address to the audience, on this topic. The conclusion from that conversation is that Geospatial Analysis or Engineering includes high accuracy data collection, manipulation, and applications. Data analysis in a GIS environment, not including high accuracy data collection, is more appropriate as Geographical Information Systems (GIS).

Mr. Johanesen visits many university settings and industry in his recruiting efforts. He shared that in other universities, even when departments overlap in some of the GIS components, there is no duplication in the use of the term

“Geospatial”. In recent years, both Purdue and Virginia Tech went through the creation of departments and centers with some similarities, but did not duplicate names.

3. Civil Engineering Geospatial Option Program

The Civil Engineering (CE) Department’s **Geospatial Option** key courses better aligns and corresponds to the “Geospatial” technical areas of expertise. The Geospatial Option already includes high accuracy data collection, adjustment and spatial analysis in several of its courses. The CE Geospatial option students currently take the (mandatory) following classes, covering high accuracy data collection for digital cartography/mapping, with post-processing adjustment and data quality analysis.

The Civil Engineering (CE) Department’s **Geospatial Option will continue to exist in semester** calendar. All its components of high accuracy data collection, data processing and analysis and data quality will continue to exist. Students in the CE Geospatial Option will take the following specific courses covering spatial data, processing, analysis and applications:

Quarter	Semester
<p>Civil Engineering common courses +</p> <ul style="list-style-type: none"> • CE127/L - CAD I (1/1) • CE128L - CAD II (1) • CE134/L - Elementary Surveying (2/2) • CE220/L - Advanced Surveying (3/1) • CE240 - Surveying Computations (3) • CE313 - Land Survey Descriptions (4) • CE311/L - Geodesy and Satellite Surveying (3/1) • CE331 - Public Land Surveys (3) • CE420/L - Digital Mapping (3/1) • CE427/L - Photogrammetry and Remote Sensing (3/1) • CE482/L - Subdivision Design (3/1) • CE484/L - Geographical Information Systems (GIS) (3/1) • CE465 - Geospatial Engineering Seminar (1) • EGR322 - California Land and Boundaries Law (4) • CE491/2/3 - Senior Design Projects (including project based high accuracy Geospatial data 	<p>Civil Engineering common courses +</p> <ul style="list-style-type: none"> • CE1001/L - Civil Engineering Design (1/1) • CE1011/L - Surveying Engineering (3/1) • CE3301 - Engineering Geomatics (3) • CE4301/L - Digital Mapping (2/1) • CE4320/L - Subdivision Engineering and Land Survey Descriptions (3/1) • CE4331/L - GIS Applications & Remote Sensing(2/1) • CE4341/L - Satellite Surveying in Engineering (2/1) • CE4350/L - Photogrammetry (2/1) • EGR3321/A - CA Boundary Law and Public Lands (3/1) • EGR4810/20/30 - Project Design Principles and Applications (1/1/1)

collection, processing, analysis and applications) (1/2/1)	
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4. Current Geography and Anthropology department Geographical Information Systems (GIS) Option

The Geography and Anthropology Department currently offers the option in Geographical Information Systems (GIS). The key courses align with geography, non-surveying mapping and geographical information systems.

Quarter	Semester
<p>Geography major common courses +</p> <ul style="list-style-type: none"> • 210G10E140 222/222A - Introduction to Cartography (3/1) • GEO 240/240A - Introduction to Geographic Information Systems (3/1) • GEO 303 - Climatology (4) • GEO 305 - Advanced Physical Geography I (4) • GEO 309 - Field Geography (4) • GEO 310 - Cultural Geography (4) • GEO 315 - Urban Geography (4) • GEO 320/320A - Rural Geography (3/1) • GEO 330/330A - Environmental Geography (3/1) • GEO 350 - U.S. and Canada Geography (4) • GEO 351 - Geography of California (4) • GEO 352 - Geography of Latin America (4) • GEO 357 - Geography of Asia (4) • GEO 358 - Geography of Africa (4) • GEO 359 - Europe: Land and People (4) • GEO 410 - Photographic Remote Sensing (4) • GEO 420 - Digital Image Processing (4) • GEO 421/421L - Computer Cartography (3/1) • GEO 422 - Multimedia Mapping (3) 	<p>Geography major common courses +</p> <ul style="list-style-type: none"> • GEO 1010/L - Physical Geography/Lab (2/1) • GEO 1020 - Human Geography (3) • GEO 2400/L - Introduction to Geographic Information Systems/Lab (2/1) • GEO 3090/L - Field Geography/Lab (2/1) • GEO 35xx - Regional Geography (3) • GEO 4610 - Senior Project/Capstone I (3) • GEO 3220/L - GIS Programming and Application/Lab (2/1) • GEO 4400/L - Advanced Geographic Information Systems/Lab (2/1) • GEO 4100/L - Remote Sensing of the Environment/Lab (2/1) • GEO4430/L - Quantitative Spatial Analysis/Lab (2/1) • GEO4050/L - Geo-Demographics Using GIS/Lab (2/1) • Electives

<ul style="list-style-type: none"> • GEO 422A - Multimedia Mapping Activity (1) • GEO 442/442A - Advanced Geographic Information Systems I (3/1) • GEO 443/443A - Advanced Geographic Information Systems II (3/1) • Electives 	
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The Geography and Anthropology department is proposing a new semester course GEO 4430/L – Quantitative Spatial Analysis/Lab (2/1) trying to address quantitative aspects of spatial data. This would be the closest course to geospatial analysis incorporating higher accuracy data analysis. The course description is “Quantitative analysis methods for research in the spatial sciences. Characteristics of geographic data (attributes of objects and fields in geographic space). Probability, hypothesis testing and confidence intervals. Summary, descriptive and exploratory statistics for geographic data. Regression modeling. Spatial autocorrelation and spatial regression methods.”

The proposed course, and the other courses that comprise the proposed option, cover statistical examination of GIS data. The proposed option still does not cover the high accuracy data collection and analysis covered by the existing and converted geospatial option in the College of Engineering.

5. Summary

1 – Having two options with the same designation “Geospatial” at Cal Poly Pomona is confusing for the students, and for the industry – local and state geospatial hiring industry that already hire from Geospatial engineering students would be confused. This would give the students in the new option false expectations in campus events already set under the title of geospatial engineering.

2 – In an opinion conversation with the National Geospatial-Intelligence Agency (NGA) Director of the Office of Sciences and Methodologies (and Geospatial staff recruiter)

- a) Although NGA recruits from the social sciences and GIS programs for the geospatial projects, the expectation is for geospatial graduates to have knowledge of high accuracy data collection, manipulation, analysis, adjustment. One area specifically mentioned by Todd Johannesen was the need to have training and understanding of Photogrammetry and 3D modeling from airborne and spaceborne surveying/data collection (besides high accuracy data collection) – it seems that this expectation is in line with the Geospatial option in the College of Engineering

- b) There is evidence that in other US Universities, it has been decided to keep only one program using the title “Geospatial” in order to avoid confusion referred in 1.

3- The current Geospatial Engineering option in the Civil Engineering department covers high accuracy technical and analytic background to its graduates in a very wide range of areas. The GIS option in the Geography and Anthropology department is based on GIS and has not been extended to cover high accuracy spatial data collection, manipulation, and analysis.

6. Conclusion:

The GIS option curriculum under the quarter system and the proposed curriculum for the semester system, does not incorporate high accurate data acquisition and adjustment to have all the components of geospatial analysis. The option in the Geography and Anthropology Department concentrates on geographic information systems (GIS) analyses. The CE department opposes to this name change to Geospatial Analysis Option as reasons stated above and suggests it to keep its current name of GIS Option.

Geography and Anthropology Department response to concerns raised by Civil Engineering regarding Geography Program - Geospatial Analysis Option name change October 21, 2016

1. “Geospatial” is not an exclusive term for “high accuracy data collection, processing” that is the core of survey engineering. Here are a few examples to illustrate that the term is frequently used in geography and other programs, including in the context of jobs, and career options:

Here is a quote from “Future U.S. Workforce for **Geospatial** Intelligence” (2013) prepared by Committee on the Future U.S. Workforce for Geospatial Intelligence; Board on Earth Sciences and Resources; Division on Earth and Life Studies; Board on Higher Education and Workforce; Policy and Global Affairs; National Research Council: “Undergraduate degree programs are the primary supplier of **geospatial** skills, concepts, and knowledge for most **geospatial analysts**. The Department of **Geography** at the University of Colorado, Boulder, offers a typical undergraduate curriculum that teaches geospatial knowledge and skills.” It further details the curriculum a typical geography department offers which is very similar to what geography offers here at CPP (<https://www.nap.edu/read/18265/chapter/8> , Accessed Oct. 19, 2016)

Graduate Certificate in **Geospatial** Intelligence Analytics – Penn State Univ describes their program “prepare you to use critical thinking, knowledge of **human and physical geography**, problem-solving abilities, and geographic information technologies to confront challenges such as disaster response, emergency management, and military operations.” Apparently, this is another geography based program.

From our own CSU system, the CSU GIS centers publication is titled CSU **Geospatial** Review (http://csugis.sfsu.edu/CSU_Geospatial_Review/CSU_GeospatialReview.htm Accessed Oct. 19, 2016), which publishes work from CSU faculty (Geography faculty at CPP have published work in the CSU Geospatial Review and Dr. Reibel is one of three co-editors of this refereed publication). These example illustrate that “Geospatial” is an inclusive term that certainly includes the focus and content of geography programs. Moreover there is no attempt on the part of the geography program to claim that we are providing engineering training or education. Since all the engineering degree options clearly include the word “Engineering” in their titles there can be no confusion among students, potential employers or anyone else what a **Geography major** is prepared for and what an **Engineering major** is prepared for, even though both programs may have a geospatial component.

2. A duplicate **word** in a program name or option name is not a duplicate **name** for a program or option.

The name of the proposed geography option is Bachelor of Science in Geography option in Geospatial Analysis. The name of the civil engineering subplan is Bachelor of Science in Civil Engineering, subplan in Geospatial Engineering. If no duplicate word should occur in different program names, several programs in the university across different colleges should change their names to take out the word “computer”.

3. The original option name Geographic Information System correctly reflected the initial program established in the 1990s when the focus was placed on the hardware and software system. Over two decades, GIS field has evolved and matured to focus more on geospatial

theory and analysis that included multidisciplinary foundations across natural sciences, humanities, and technology. Changing the option name to “Geospatial Analysis” correctly reflects our current curriculum and the field. It, in fact, better clarifies what students in this option are prepared for.

We hope this helps to clarify the issue raised by civil engineering.