

# Update

## Program (GIS) - Geographic Information Systems Cert CT.3449

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### Program Catalog Summary:

Geographic Information Systems Certificate:

SC Program: CT.3449

**PROGRAM DESCRIPTION:** The Geographic Information Systems (GIS) Certificate at Shasta College provides students with the knowledge and skills needed to apply principles, methods and tools of geographic information systems (GIS). Students develop foundation principles of maps, geographically referenced data, imagery and global positioning systems. GIS fundamentals are taught, both in conceptual and practical terms. Students learn the design of geographic databases and the capture of data using global positioning systems (GPS) and remotely sensed imagery. Spatial analysis skills are developed, from basic geographic inquiry through more complex analysis using GIS overlays and models. Students learn the principles and practice of remote sensing and image processing for integration with GIS and GPS. Maps are designed and implemented for output in hardcopy and digital formats. Worksite learning allows students to gain GIS workplace experience and to develop contacts among the community of GIS professionals. Successful students will have strong computer and critical thinking skills. Refer to <http://www.shastacollege.edu/gis> for more information.

This certificate is pending approval through the California Community College Chancellor's Office. Upon satisfactory completion of all degree requirements and filing an application for graduation with Admissions and Records, the student's transcript will reflect completion of this degree.

### PROGRAM LEARNING OUTCOMES:

Upon successful completion of this certificate, the student should be able to:

1. Explain and summarize key GIS concepts, applications and societal implications.
2. Perform GIS data acquisition, capture, editing, and attributing.
3. Manage GIS data through file management, database design, geo-referencing and conversion.
4. Perform GIS analysis using queries, overlay functions, and models.
5. Produce a portfolio of maps demonstrating effective communication, design aesthetics, application of GIS tools and use of cartographic standards.
6. Employ best practices for GIS project design, planning, and implementation.
7. Effectively engage with community through projects, volunteer activities, user meetings and worksite learning.

**GAINFUL EMPLOYMENT INFORMATION:** For information about our graduation rates, the median debt of students who completed this certificate, and other important information, please visit our website at [http://www.shastacollege.edu/gis\\_gainful\\_employment](http://www.shastacollege.edu/gis_gainful_employment).

### CERTIFICATE REQUIREMENTS:

GEOG 5 Digital Plant: GIS and Society 3  
GEOG 9 Map and Geospatial Principles 3  
GEOG 10 Introduction to GIS 3  
GEOG 12 GIS Data Design and Capture 3  
GEOG 13 GIS Spatial Analysis OR 3  
GEOG 14 GIS Cartography and Visualization OR  
GEOG 15 Introduction to Remote Sensing  
GEOG 21 GIS-CAD Integration OR 1  
GEOG 24 Customizing GIS OR  
GEOG 25 GIS Projects

## Fall 2017

**Prepared By:** Dan Scollon

**Improvements needed? Reference Items from program review - e.g. equipment, software, or personnel:** The principle recommended program improvement is the increase emphasis on online course delivery. This is reflected in the GEOG/GIS Area Plan and corresponding initiatives. This program improvement will also relate to the AS Degree in GIS. **Who completed this form?:** Dan Scollon

**Participation in the report:** Area Faculty (list in the next box), Advisory Committee (if one exists)

**Summarize Participation comments:** In meetings with Adjunct GIS faculty (Shoemaker, Hedemark, Hansen) and the GIS Advisory Committee, there was a recognition that community and job market factors warrant a shift towards increased online course delivery. Online course delivery is well-suited information technology.

**Recommendation for Discontinuance?:** N/A

**Analyze Overall PLO achievement:** This review is taking place after a period during which PLOs were not being assessed at Shasta College, as part of the wider institutional evaluation of the learning outcome process.

**What changes could be (or have been) made to improve the program?:** Fully online course delivery. Presently only one course in the GIS Certification program has been offered fully online (GEOG 5). Two courses, GEOG 9 and 10, have been piloted online with limited success. This year's initiatives will lead to a more formal approach to online course design, including OEI compatibility, and best practices for course design for student success.

**Resources needed to implement the changes noted above:** Per area plan initiatives, funding resources are needed for online advertising (search engine marketing or SEM) at \$5000 per semester (\$10,000 for two semesters). In addition, \$2000 is requested for two adjunct faculty to work on the migration of GEOG 10 to online, OEI-approved delivery. Total funds requested: \$12,000.

**Labor Market Demand:** The U.S. Department of Labor (19% increase from 2016-2026; much higher than average; for Cartographers and Photogrammetrists), California Employment Development Dept. (44% increase from 2014-2024; for Cartographers and Photogrammetrists), the press (Wired Magazine in a Nov. 2017 article titled MAPPING THE FUTURE: CARTOGRAPHY STAGES A COMEBACK citing at 30% projected growth to 2024 and local advisers ("we don't look at applicants w/o GIS", Justin Barrett, Alpine Information Systems).

**Duplication of training:** It is widely recognized that there are abundant opportunities for online education in a wide array of disciplines, GIS included. As such, there are online GIS certificate programs available (e.g., Humboldt State) and GIS degree and certificate programs available at Community Colleges (e.g., Southwestern Community College, American River College). There are also online training options available from private vendors such as Esri. Shasta College's GIS Program has several unique assets that differentiate us from the competition: robust course offerings; strong connections with regional partners in industry and government, affordability, C-ID alignment, expertise in OEI that may result in statewide approval and statewide student recruiting.

**Program effectiveness:** Shasta College GIS graduates are employed in businesses, government and non-profit organizations across the North State. These include Shasta County, City of Redding, Vestra Resources, Enplan, CalTrans, Cal Fish and Wildlife, Stantec (formerly North State Resources) and others. Program Awards data (Tableau) shows the following GIS Certificate program awards for the preceding 5 school years (2012/13 thru 2016/17): 3, 4, 0, 4, 7. One consideration is the approval by the Chancellor's Office of GIS Certificate for 2013/14, which increased units to 18-30. Increase in past year is promising, and may reflect completion by students who have been in the program for the preceding few years. Moving student through completion is an on-going challenge.

**Other data indications for program improvement:** The following analysis of course information data related to course section offerings, enrollments, success and retention is based on data provided through Tableau. The focus is on core courses in the current GIS Certificate program, which excludes several earlier courses (GIS 1, GIS 11) which are no longer offered. Several courses are unique in the program. GEOG 5 is a GE course (CSU pattern, D5: Geography) is offered fully online. GEOG 9 is required for NR and Horticulture majors, as well as GIS students (articulates to CSU and C-ID aligned). GEOG 10 is required for Forestry majors, as well as GIS students (articulates to CSU and C-ID aligned). All courses were offered one section per semester with a few exceptions (GEOG 9, 2 sections each in 2013/14, 2014-15) and GEOG 10 (2 sections in 2015), GEOG 5 (2 section in 2015-16). For GEOG 5, average enrollments ranged from a low of 18 to a high of 32, which is supported by online delivery and late-start offering. Online delivery is also reflected in success and retention figures. This course had a range of success from 55% to 69%, and a range of retention from 66% to 87%. For GEOG 9, average enrollment per section ranged from 22 to 31. Retention for this course ranged from 70% to 95%, and success at 67% to 85% respectively. Lower retention and success resulted when this course was offered fully online (NR students in particular tend to prefer in-class offerings). For GEOG 10, average enrollment per section ranged from 13 to 26. Challenges in getting stronger enrollments in this course or partly driving the decision to shift to a

fully online delivery, as the emphasis for course offering. Retention and success numbers for this course are quite similar ranging from the mid-70% to the high 80% range. Review of the second semester courses, in particular the GEOG 12, 13 and 14, all show average enrollments in the range of 12 to 17 (with one outlier being enrollment of 26) similarly retention and success in these courses is quite strong. Again, online delivery is hoped to increase these numbers. With numbers in the 90% range for many of the courses. GEOG 15, remote sensing, showed the lowest success rate with 76%, and the GEOG 13 class showed hundred percent retention and success.

**Replicating community college programs north of Sacramento?:** No

**CSU and UC Transfer impact analysis::**

Alignment of GEOG 9 and GEOG 10 to C-ID, as well as articulation of these courses, plus GEOG 15, to Humboldt State and CSU Chico, represent transfer benefit to Certificate program students. UC articulation has not yet been achieved, since GIS is not currently accepted for articulation.

**Influence on related programs and services:** Related Shasta College Programs: AS Degree in GIS, Geography AAt, and AS Degree in Natural Resources.

**Specific additional program reflections:** GIS skills continue to be in demand across different industry sectors. This is reflected in the projections from the U.S. Department of Labor (19% increase from 2016-2026; much higher than average; for Cartographers and Photogrammetrists), California Employment Development Dept. (44% increase from 2014-2024; for Cartographers and Photogrammetrists), the press (Wired Magazine in a Nov. 2017 article titled MAPPING THE FUTURE: CARTOGRAPHY STAGES A COMEBACK citing a 30% projected growth to 2024 and local advisers ("we don't look at applicants w/o GIS", Justin Barrett, Alpine Information Systems).

**Other factors for consideration:** Industry level certification is emerging, especially driven by the GIS Certification Institute which is moving towards Technician Certification (Professional Certification is only current option).

## PROGRAM AWARDS

Award Type	Program Type	2012-13	2013-14	2014-15	2015-16	2016-17
Certificate	Geographic Information Systems Cert	0	0	0	4	7
Grand Total		0	0	0	4	7

## COURSE STATISTICS

		Academic Year				
		2012-13	2013-14	2014-15	2015-16	2016-17
GEOG-5	# of Sections	1.0	1.0	1.0	2.0	1.0
	Enrollment	32.0	27.0	18.0	57.0	22.0
	FTES	2.6	1.8	1.7	5.3	1.9
	FTEF	0.20	0.20	0.20	0.40	0.20
	WSCH	80.0	56.0	52.0	163.0	59.0
	Avg Enrl/Section	32	27	18	29	22
	Avg FTES FTEF	13.00	9.00	8.50	13.25	9.50
	Avg WSCH FTEF	400.0	280.0	260.0	407.5	295.0
GEOG-9	# of Sections		2.0	2.0	1.0	1.0
	Enrollment		49.0	39.0	31.0	24.0
	FTES		6.8	4.2	2.9	4.0
	FTEF		0.57	0.57	0.28	0.28
	WSCH		205.0	157.0	144.0	120.0
	Avg Enrl/Section		25	20	31	24
	Avg FTES FTEF		12.05	7.36	10.24	14.12
	Avg WSCH FTEF		361.8	277.1	508.3	423.6
GEOG-10	# of Sections		1.0	2.0	1.0	1.0
	Enrollment		26.0	25.0	19.0	17.0
	FTES		1.8	3.8	2.5	2.8
	FTEF		0.28	0.57	0.28	0.28
	WSCH		93.0	115.0	75.0	85.0
	Avg Enrl/Section		26	13	19	17
	Avg FTES FTEF		6.35	6.76	8.82	9.99
	Avg WSCH FTEF		328.3	203.0	264.7	300.0
GEOG-12	# of Sections			1.0	2.0	1.0
	Enrollment			11.0	23.0	12.0
	FTES			1.7	2.2	0.0
	FTEF			0.28	0.57	0.28
	WSCH			50.0	90.0	0.0
	Avg Enrl/Section			11	12	12
	Avg FTES FTEF			5.89	3.85	0.00
	Avg WSCH FTEF			176.5	158.8	0.0
GEOG-13	# of Sections			1.0	1.0	
	Enrollment			13.0	13.0	
	FTES			2.1	2.2	
	FTEF			0.28	0.28	
	WSCH			62.0	67.0	
	Avg Enrl/Section			13	13	
	Avg FTES FTEF			7.06	7.66	
	Avg WSCH FTEF			218.8	236.5	
GEOG-14	# of Sections		1.0	1.0	1.0	
	Enrollment		14.0	12.0	13.0	
	FTES		1.7	2.0	2.2	

	FTEF		0.28	0.28	0.28
	WSCH		50.0	60.0	65.0
	Avg Enrl/Section		14	12	13
	Avg FTES FTEF		5.89	7.06	7.66
	Avg WSCH FTEF		176.5	211.8	229.4
GEOG-15	# of Sections			1.0	1.0
	Enrollment			12.0	17.0
	FTES			1.7	2.1
	FTEF			0.28	0.28
	WSCH			50.0	87.0
	Avg Enrl/Section			12	17
	Avg FTES FTEF			5.89	6.00
	Avg WSCH FTEF			176.5	307.1
GEOG-21	# of Sections				1.0
	Enrollment				16.0
	FTES				0.9
	FTEF				0.11
	WSCH				27.0
	Avg Enrl/Section				16
	Avg FTES FTEF				8.03
	Avg WSCH FTEF				249.3
GEOG-25	# of Sections			1.0	1.0
	Enrollment			14.0	11.0
	FTES			0.9	0.7
	FTEF			0.11	0.11
	WSCH			26.0	22.0
	Avg Enrl/Section			14	11
	Avg FTES FTEF			8.03	6.74
	Avg WSCH FTEF			240.1	203.1
GEOG-94	# of Sections	4.0	3.0	6.0	4.0
	Enrollment	6.0	5.0	13.0	16.0
	FTES	0.3	0.2	0.7	0.9
	FTEF	0.00	0.00	0.00	0.00
	WSCH	34.0	26.0	56.0	116.0
	Avg Enrl/Section	2	2	2	4
	Avg FTES FTEF				
	Avg WSCH FTEF				
Grand Total	# of Sections	1.0	9.0	13.0	16.0
	Enrollment	32.0	84.0	73.0	97.0
	FTES	2.6	12.4	18.2	20.4
	FTEF	0.20	1.33	2.57	2.49
	WSCH	80.0	438.0	598.0	769.0
	Avg Enrl/Section	32	9	6	6
	Avg FTES FTEF	13.00	9.07	7.07	8.13
	Avg WSCH FTEF	400.0	301.7	224.4	288.2