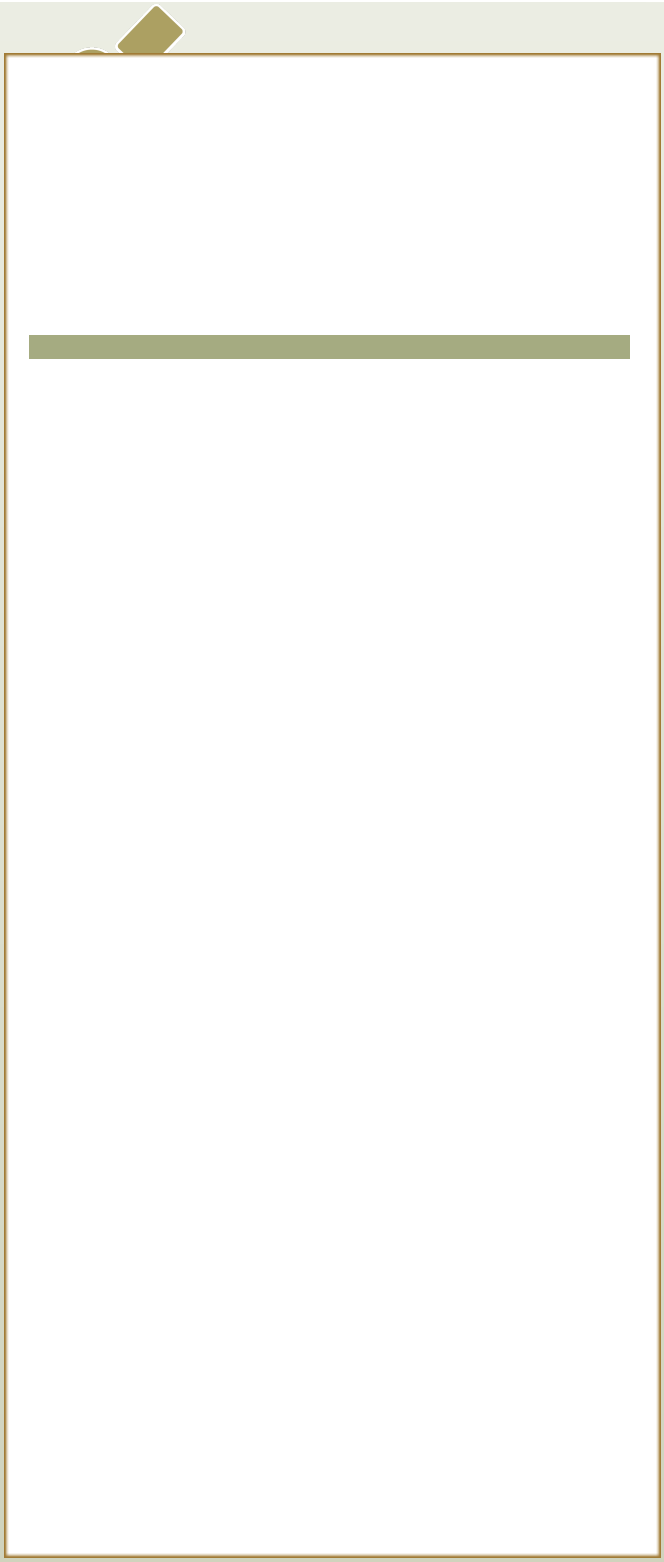


CONTENTS

GsAL

Description of the Geospatial Analysis Lab (GsAL)

Geospatial Analysis Lab (GsAL) provides education and support for all GIS based learning at the University of San Francisco. The aim of the GsAL is to provide members of our community with a comprehensive understanding of geographic technologies and techniques including, but not limited to ESRI's ArcGIS, Google's Earth Engine, web mapping applications, and remote sensing. In addition,
the GsAL provides GIS consultations and project management for students, staff, faculty and external parties pursuing independent projects and research programs. Development of the USF's GsAL is composed of four main elements that are being cultivated using a phased approach. The four elements include Education, Research, Internal Presence, and External Presence.

- **Education** includes the development of classes that can be utilized by current degree-seeking students from several departments both at the graduate and undergraduate level. ***This is to be complemented by a certificate program that can be utilized by nondegree students.*** The certificate program offers courses for industry specific topics such as ESRI's ArcGIS, LiDAR and Google's Earth Engine.

- **Research** focuses on the disciplines that utilize geospatial analytics and aims to reach out to disciplines that can be integrated into existing efforts.

- **Internal Presence** incorporates building a geospatial community of practice within and between departments at USF.

- **External Presence** focuses on leveraging existing external relationships to position USF as a premier GIS research and training institution within specific disciplines.

GsAL GIS Certification Program Assessment

Identification Information

1: Name of Program: **GIS Certification**

2: Type of Program: **Form A Certification**

3: College of Arts and Science Division: **Sciences**

4: Name/Title/E-Mail Address of Submitter**:**
David Saah, Associate Professor and Director of GsAL, dssaah@usfca.edu
5: Name/Title/E-Mail Address of Additional Individuals Who Should Receive Feedback:
Tracy Benning, Associate Professor, tlbenning@usfca.edu
AJ Purdy, Assistant Professor, apurdy@usfca.edu

GsAL GIS Certification Mission Statement

The Geospatial Certification program provides students with a project based curriculum teaching the latest geospatial technologies and applications that allow certificate recipients to pursue cutting edge geospatial technology jobs.

Program Learning Outcomes (PLOs)

PLO 1: Demonstrate a mastery of concepts in geospatial science
PLO 2: Demonstrate proficiency in multiple geospatial science technologies
PLO 3: Apply scientific methodology to a geospatial based question and/or issue
PLO 4: Skillfully communicate geospatial topics through written reports, oral presentations and/or multimedia displays

Curriculum Maps

GsAL

	Status	PLO 1: Demonstrate a mastery of concepts in geospatial science	PLO 2: Demonstrate proficiency in multiple geospatial science technologies	PLO 3: Apply scientific methodology to a geospatial based question and/or issue	PLO 4: Skillfully communicate geospat topics through writte reports, oral presentati and/or multimedia disp
GIS 1	Active	I			
GIS 2	Active	D		D	M
GIS 3	Active	M		M	M
1: Geotechnologies	Active	I	I		D
2: Google Earth Engine	Active	D	D	D	D
3: Web Mapping	Active	D	D	D	D
4: GeoHydrology	Planned	D	D	D	D
5: Urban Planning	Planned	D	D		D
6: LiDAR	Active	D	D	D	D
7: Google Geo Tools	Retired	D	D		D
8: Geostatistics	Active	D	D	D	D
9: Public Health	Planned	D	D	D	D
10: Intro Remote Sensing	Active	D	D	D	D
11: GIS Practicum	Active	M	M	M	M
12: Drone Technologies	Active	D	D	D	D

GsAL

	PLO 1: Demonstrate a mastery of concepts in geospatial science	PLO 2: Demonstrate proficiency in multiple geospatial science technologies	PLO 3: Apply scientific methodology to a geospatial based question and/or issue	PLO 4: Skillfully communicate geospatial topics through written reports, oral presentations and/or multimedia displays
ILO 1—Students reflect on and analyze their attitudes, beliefs, values, and assumptions about diverse communities and cultures and contribute to the common good.			X	X
ILO 2—Students explain and apply disciplinary concepts, practices, and ethics of their chosen academic discipline in diverse communities.	X	X	X	X
ILO 3—Students construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources.		X	X	X
ILO 4— Students communicate effectively in written and oral forms to interact with their personal and professional communities.			X	X
ILO 5— Students use technology to access and communicate information in their personal and professional lives.	X	X	X	X
ILO 6— Students use multiple methods of inquiry and research processes to answer questions and solve problems.		X	X	X
ILO 7— Students describe, analyze, and evaluate global interconnectedness in social, economic, environmental and political systems that shape diverse groups within the San Francisco Bay Area and the world.			X	X

GsAL

Assessment Method

15: Which of your Program Learning Outcomes did you assess during 2017-2018?

During the 2017-2018 Academic year, the Geospatial Analysis Laboratory assessed PLO #1: Develop a mastery of concepts in geospatial science

16. What student work products did you use to assess your PLO(s)? Pick one or more direct methods from the list below and briefly describe below what specific work product(s) you used.

Other: Course exam questions

17. Brief description of student work products used to assess PLOs

Student responses to specific multiple choice exam questions that demonstrate a mastery in concepts in geospatial science.

18. What tools did you use to evaluate the student work product(s) (e.g. rubric, test score)?

Test score

19. Please upload any tools used to evaluate student work product(s) here in PDF format only. Please use descriptive file names (e.g. "SociologyAssessmentRubric.PDF").

Multiple exam questions and answers are attached below. These questions originate from in class quiz or exams recorded in Canvas for 2 courses taught by 3 difference instructors: ENVS 375 & ENVM 673 (2).

20. Who evaluated the student work product? Check all that apply.

FT faculty members who were instructor(s) of the course(s)

21. Describe the calibration procedure you employed, if any (i.e., how did you assure that faculty raters were consistent with each other in how they rated the student work products):

We used multiple choice and true/false questions to remove any type of faculty bias.

22. What indirect methods did you employ, if any?

NA

23. Please indicate and briefly describe what indirect methods you used (and/or attach the survey/script/interview below).

NA

24. Files submitted:

NA

Results

25. What were the direct data results? *

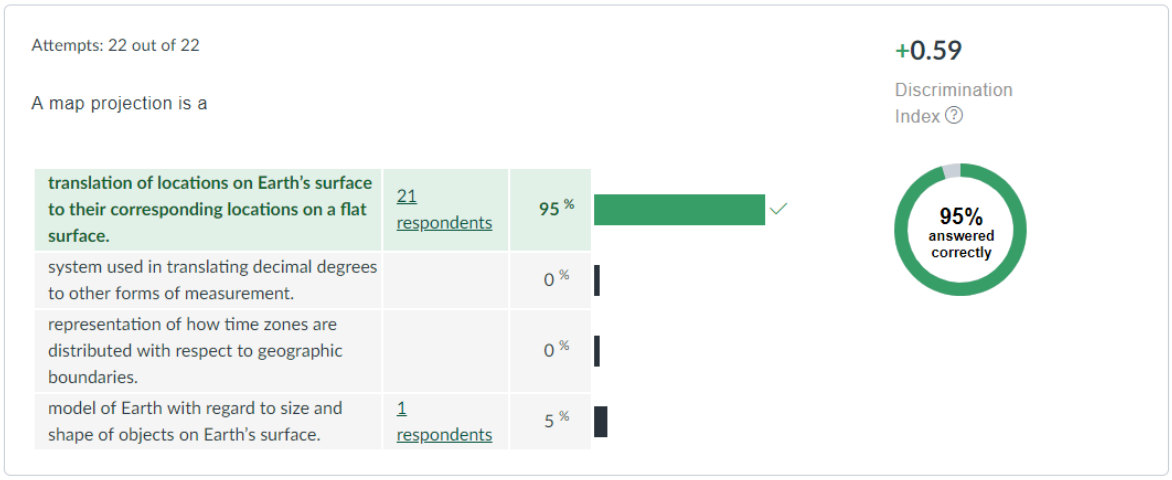
GsAL

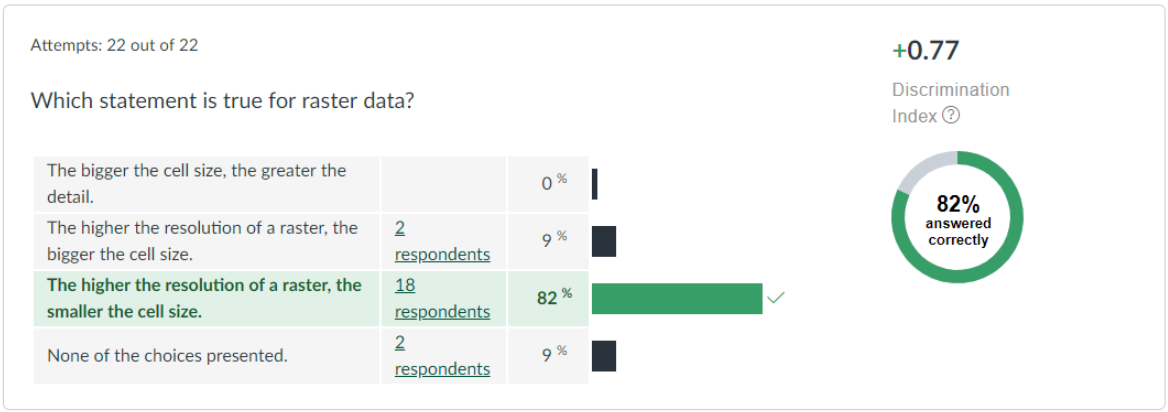
Each figure below demonstrates student performance for a variety of multiple choice and true / false questions. Course information is provided at the start of each section.

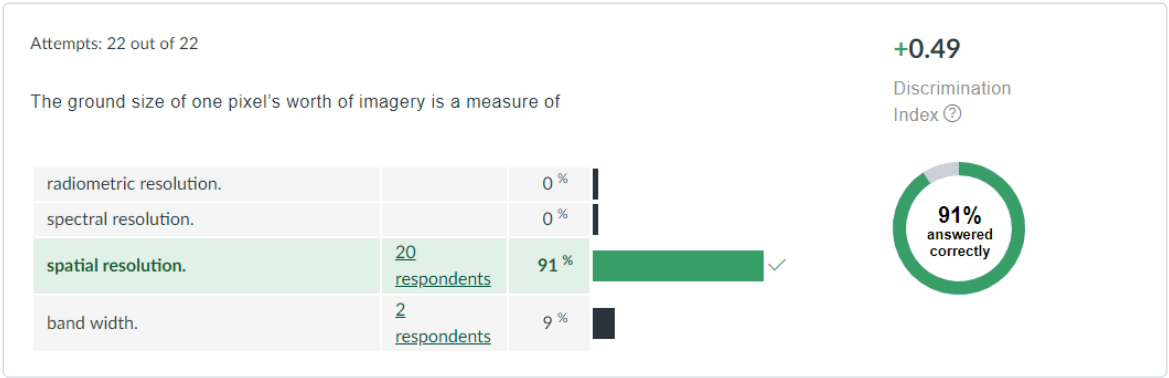
Semester/Year: Fall 2017

Course: ENVS 375 Intro to Geospatial Technology with Lab

Instructor: Tracy Benning



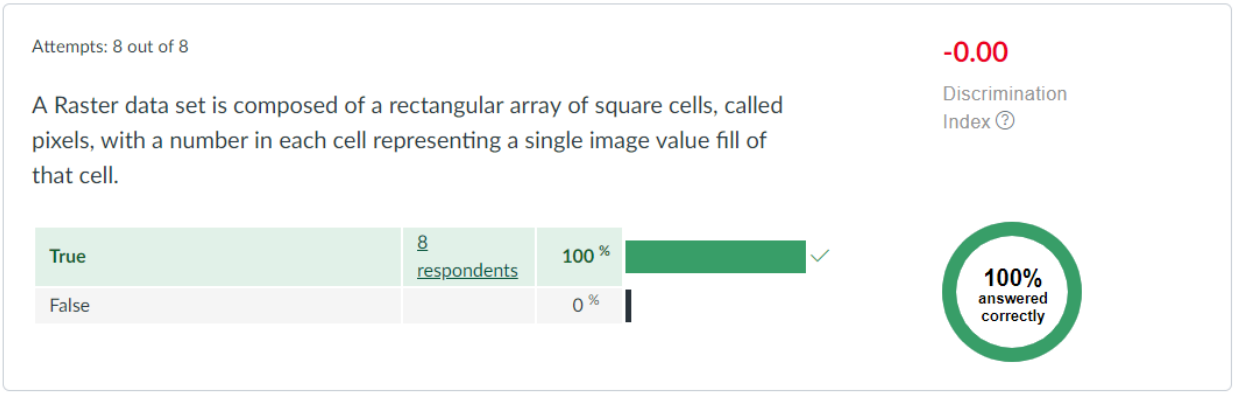


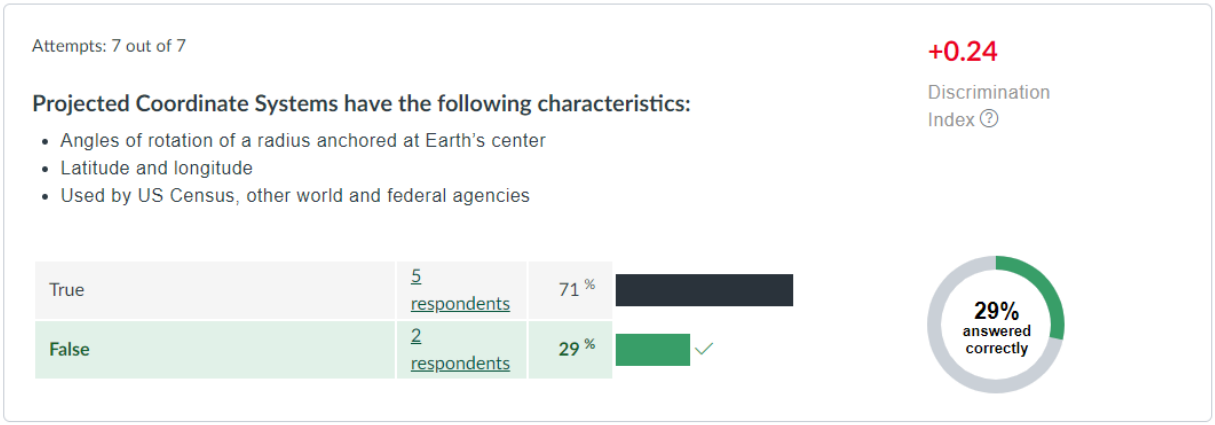


Semester/Year: Fall 2017

Course: ENVM 673 Accelerated Introduction to GIS

Instructor: Elizabeth Sun



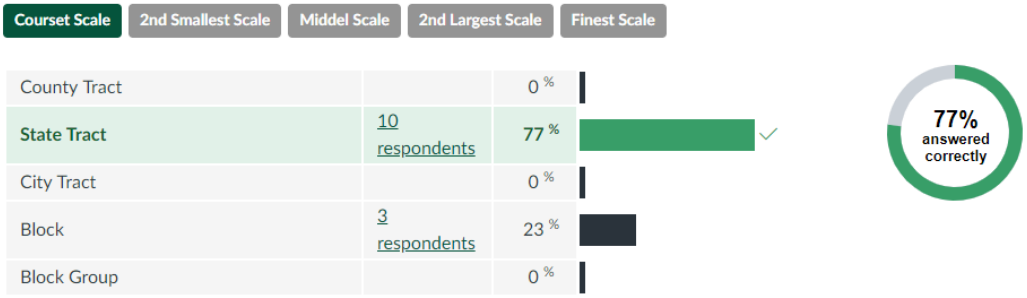


Attempts: 13 out of 13

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

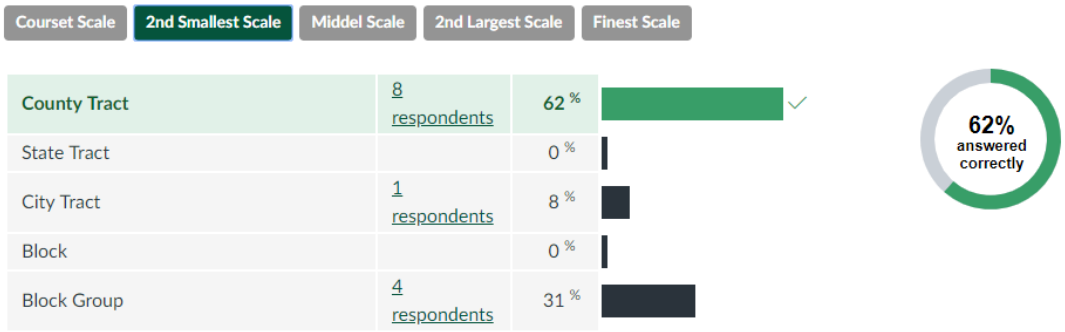


Attempts: 13 out of 13

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale



Attempts: 13 out of 13

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | 2nd Smallest Scale | **Middel Scale** | 2nd Largest Scale | Finest Scale

County Tract	1 respondents	8 %
State Tract		0 %
City Tract	12 respondents	92 %
Block		0 %
Block Group		0 %

Attempts: 13 out of 13

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | 2nd Smallest Scale | Middel Scale | **2nd Largest Scale** | Finest Scale

County Tract	4 respondents	31 %
State Tract		0 %
City Tract		0 %
Block		0 %
Block Group	9 respondents	69 %

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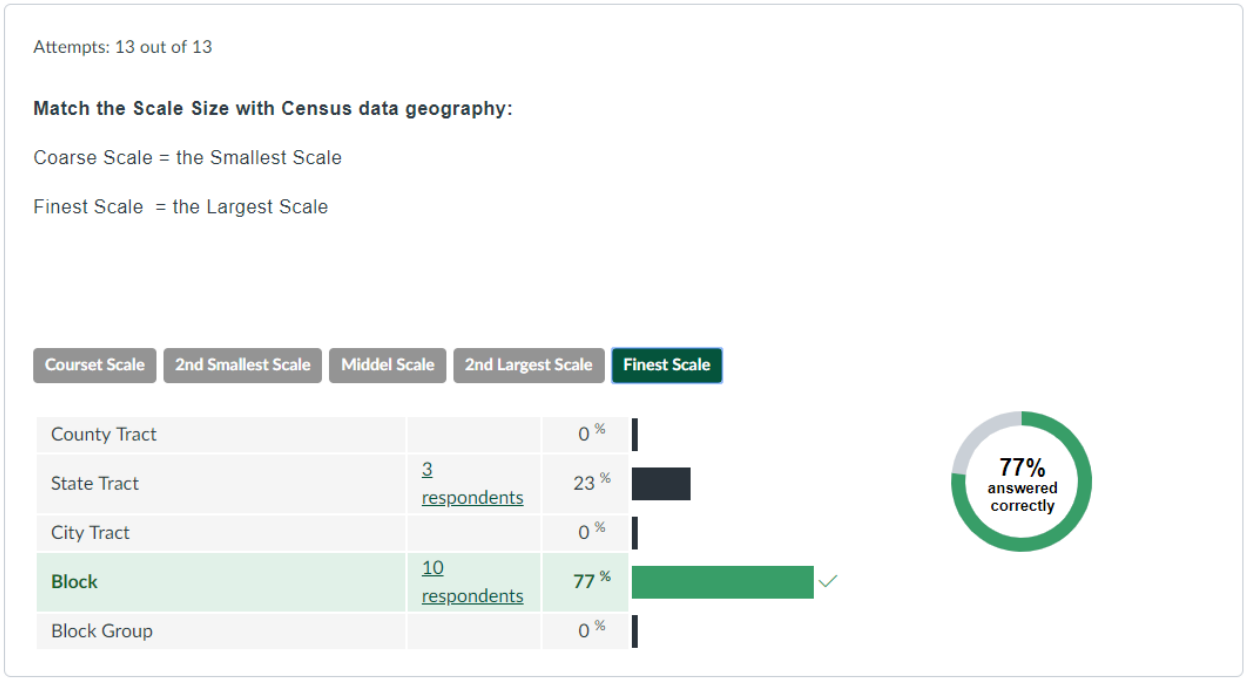
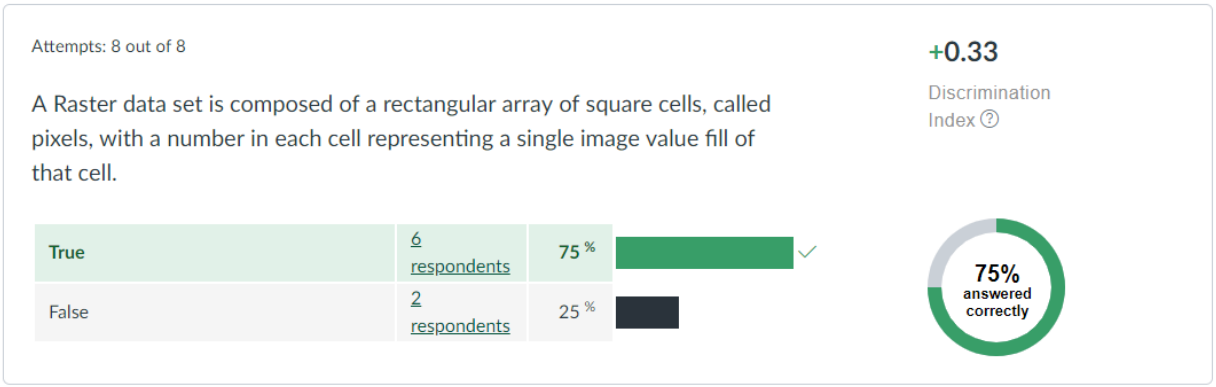


Semester/Year: Spring 2018

Course: ENVM 673 Accelerated Introduction to GIS

Instructor: Fernanda Lopez Ornelas



Attempts: 5 out of 5

+0.60

Discrimination Index

Geographic Coordinate System (GCS) have the following characteristics:

- Angles of rotation of a radius anchored at Earth's center
- Latitude and longitude
- Used by US Census, other world and federal agencies

True	3 respondents	60 % ✓
False	2 respondents	40 %

Attempts: 12 out of 12

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | 2nd Smallest Scale | Middel Scale | 2nd Largest Scale | Finest Scale

Block		0 %
City Tract		0 %
Block Group	1 respondents	8 %
County Tract		0 %
State Tract	11 respondents	92 % ✓

GsAL

Attempts: 12 out of 12

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | **2nd Smallest Scale** | Middel Scale | 2nd Largest Scale | Finest Scale

Block	1 respondents	8 %
City Tract	1 respondents	8 %
Block Group		0 %
County Tract	10 respondents	83 %
State Tract		0 %

Attempts: 12 out of 12

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | 2nd Smallest Scale | **Middel Scale** | 2nd Largest Scale | Finest Scale

Block		0 %
City Tract	11 respondents	92 %
Block Group		0 %
County Tract	1 respondents	8 %
State Tract		0 %

GsAL

Attempts: 12 out of 12

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | 2nd Smallest Scale | Middel Scale | **2nd Largest Scale** | Finest Scale

Block	1 respondents	8 %
City Tract		0 %
Block Group	10 respondents	83 %
County Tract	1 respondents	8 %
State Tract		0 %

Attempts: 12 out of 12

Match the Scale Size with Census data geography:

Coarse Scale = the Smallest Scale

Finest Scale = the Largest Scale

Courset Scale | 2nd Smallest Scale | Middel Scale | 2nd Largest Scale | **Finest Scale**

Block	10 respondents	83 %
City Tract		0 %
Block Group	1 respondents	8 %
County Tract		0 %
State Tract	1 respondents	8 %

26. What were the indirect data results? (If applicable)

GsAL

All the elements of the syllabus were recoded and assessed in the class with an average of B or higher for each specific element.

27. How do you interpret these results? What do they mean? *

The results demonstrate that students completing ENVM 673: Accelerated Introduction GIS or ENVS 375: Introduction to Geospatial Technology and GIS approach a mastery of concepts in geospatial science. Each course is the first component of the core curriculum meant to introduce a foundational knowledge in the subject. The questions surveyed above evaluate student knowledge in 3 areas: GIS data types, coordinate systems, and census data properties. A student weighted mean reveals 85 % of students achieve mastery of GIS data types. Course mean scores ranged from 75-100% for questions focused on GIS data types. For coordinate systems, the student weighted mean reveals 80% of students achieve mastery on this concept. Students show a greater proficiency in projected coordinate systems (course mean question performance ranged from 71% and 95%) compared to geographic coordinate systems (60%). A student weighted mean indicated that 82% of students achieve mastery in census data properties. Course mean scores ranged from 62-92% for individual questions on census data properties. The responses indicate that the majority of students achieve mastery in a variety of geospatial concepts surveyed here. This is the second assessment for the GSAL. It is also clear from the results that effort should be focused on improving course modules focused on coordinate systems.

Closing the Loop

28. Which of the following actions did you take as a result of the assessment results? Pick one or more and briefly describe below.

Other: Reflection and review of results in a GsAL faculty meeting.

29. Please elaborate on your potential course(s) of action, related to any/all items you checked above. *

We have identified key areas to improve course instruction and curriculum. Specifically, modules related to coordinate systems need to be improved in introductory GIS courses moving forward. A foundational knowledge in this topic should lead to improved performance in more advanced GIS courses. Furthermore, we will dedicate future assessment to core concepts that span courses as offered through the GIS certificate program.