**Assessment Plan**

**for Workforce and FOS Programs**

**Program/Track Name: Geospatial Information Science**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Description of Program-Level Learning Outcomes**

Please indicate the Program Learning Outcomes for the degree, degree track, or certificate below:

|  |  |
| --- | --- |
| Program-Level Learning Outcomes | |
| Program Learning Outcome 1: | **Apply cartographic principles to create maps and reports using Geographic Information Systems (GIS) technology.** |
| Program Learning Outcome 2: | **Acquire and analyze spatial and non-spatial data utilized in a Geographic Information System (GIS).** |
| Program Learning Outcome 3: | **Apply query and/or programming languages within a Geographic Information System (GIS).** |
| Program Learning Outcome 4: | **Display understanding of remote sensing concepts and methods to analyze remotely sensed data.** |

**Section I: Technical Courses**

For **all technical courses** in the program, indicate in the table on the following page whether and/or how the course will support the program learning outcomes. You should include courses outside your discipline area and work collaboratively with those disciplines to determine whether and/or how those course(s) will support the program learning outcomes. **Please note** that it is understandable if courses from outside the discipline do not assess the program-level learning outcomes and serve only to introduce, practice and/or emphasize the program outcomes. It is also possible that technical courses outside of your discipline may not directly support the specific program-level learning outcomes you have identified.

***How to complete the program map:***

For each technical course in your program, please indicate whether any program-level learning outcome is introduced to students (I), practiced by students (P), emphasized for students (E), or formally assessed (A).

For example, if course WXYZ 1234 introduces students to one of the program outcomes, then enter “I” for that specific program outcome in the appropriate column. Please note that a course can be “I”, “P”, “E” and/or “A” in any program outcome. The labels in the following table apply SOLELY to the program level learning outcomes defined above. (It is NOT necessary for every course to address a program level learning outcome, and it is NOT necessary that Assessment or program level learning outcomes occur in every course.)

**Program Map ▼**

I=Introduced P=Practiced E=Emphasized A=Assessed

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Program Courses | Program Learning Outcome 1 | Program Learning Outcome 2 | Program Learning Outcome 3 | Program Learning Outcome 4 |
| GISC 1411 | I, P,E | I, P | I, P | I |
| GISC 2402 | P, E | I,P,E | I,P | I,P,E |
| GISC 2250 | P | P,E | P |  |
| GISC 2335 |  | P | I,P,E,A |  |
| GISC 2420 | P,E | P,E | P,E | P |
| GISC 2231 | E,A | E,A | E | E,A |
| GISC 2172 | P |  |  |  |
| GISC 2311 | P,E | P,E | P | P,E |
| GISC 2459 | P,E | P,E | P,E | P |
| GISC 2281 (co-op) | P,E | P,E | Varies based on employer needs | Varies based on employer needs |
| ITSE 1359\* |  |  | I,P |  |
| DFTG 1309\* | I | I |  |  |
| ITSW 1307\* |  | I |  |  |
| ITSW 1304\* |  | I |  |  |

\*Course provides foundational, non-GIS specific skills that may be applied in GIS program courses.

**Assessment Plan for Program Learning Outcomes**

Review existing assessment methods and current practices for collecting/gathering student data to identify direct (and possibly indirect methods of assessment). Remember that the data will need to be gathered, analyzed, and used to support the program’s continuous improvement processes.

**Note:** Because courses from other disciplines already have assessment plans in place, they do not have to be included in this assessment plan. Nonetheless, proposers must work collaboratively with these other disciplines to stay current and up-to-date with the assessment plans in these courses.

|  |  |  |
| --- | --- | --- |
| Program-Level Learning Outcome (e.g. Students will describe the impact of various cultures on American cuisine.) | Assessment Measure(s) and Where Implemented in Curriculum – Description of Instrument(s)/ process(es) used to measure results and indication of where the assessment will be collected in curriculum. (e.g. Essay on Cultural influences on American cuisine in CUIS 1300.) | Targets- Level of Success Expected  (e.g. 80% of students score 2.5 or better on rubric for essay on cultures and cuisine.) |
| Apply cartographic principles to create maps and reports using Geographic Information Systems (GIS) technology. | Demographics Project in GISC 2231 Advanced Problems in GIS: Create a choropleth map of Texas that displays which county (or counties) have the highest percentage of non-white population. | 75% of students score 80% or above based on project rubric. |
| Acquire and analyze spatial and non-spatial data utilized in a Geographic Information System (GIS). | “Final Project in GISC 2231 Advanced Problems in GIS: Create a report and map on topic of interest to the student which demonstrates use of GIS analysis techniques on spatial and non-spatial data attributes.” | 75% of students score 80% or above based on project rubric. |
| Apply query and/or programming languages within a Geographic Information System (GIS). | “Final Project  in GISC 2335 Programming for GIS: Create a software solution to make a GIS task easier, faster, or more accurate using a scripting language (e.g. Python).  Final project report describes the task/problem and solution in detail.” | 75% of students score 80% or above based on project rubric. |
| Display understanding of remote sensing concepts and methods to analyze remotely sensed data. | NDVI Study Project in GISC 2231 Advanced Problems in GIS: Create a Normalized Difference Vegetation Index (NDVI) map of an area chosen by the student. Students must incorporate Landsat multispectral images for NDVI analysis, and vector elements to show roads, county lines, etc. to help orient the viewer. | 75% of students score 80% or above based on project rubric. |

**Appendix**

**GISC 2331 Advanced Problems in GIS: Demographics Project**

Description: “For this project, you are to create a classified, choropleth map of Texas displaying which **county (or counties)** has the highest percentage of non-white population**.** If you've ever wondered [why the Census asks about race](https://www.census.gov/acs/www/about/why-we-ask-each-question/race/), they state, "Race data are used in planning and funding government programs that provide funds or services for specific groups." This type of analysis is useful in the human/social services, education and government sectors, to name a few.

Follow the same process/steps you worked with in *GISC 2420 - Age of the Population and Where They Live* as a refresher.

1. Download the 2018 County geodatabase that contains the demographic data from [the Census.gov site](https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html) , extract and save to your GIS data or project folder.
2. Once you've created your project and loaded the data, you need to create a definition query on the county layer to display only Texas. Hint: use the STATEFP field. You can find the state FIP codes [here](https://en.wikipedia.org/wiki/Federal_Information_Processing_Standard_state_code).
3. Review the metadata and X01\_RACE tables to determine which fields to add together to create a new field with the total estimate of non-white populations. Feel free to use the discussion board to figure out the best fields to use.
4. When symbolizing, set your class break values to round numbers as you think appropriate to a professional map presentation.
5. Add appropriate labeling and finish your map following our standards.  Extra features are important, but do not crowd your map presentation.
6. Add a description of your analysis process. “

Grading Rubric Criteria

* Student utilized problem solving techniques in a structured manner in the completion of a major project or application in Geographic Information Systems. (30 points)
* Student used correct data provided for the exercise or downloaded from the appropriate source identified in the instructions. (30 points)
* Map layout effectively describes/illustrates the purpose of the map or problem to be solved. (40 points)

**GISC 2331 Advanced Problems in GIS: Final Project**

Description: “Your final project for this class will be a vector and raster-based map that should display its purpose and the results of your analysis. What you create is up to you; area of interest, map topic, data, methods of analysis, number of map frames, etc.

Below are the requirements for the final project:

* Display at least 1 use of a raster function (classification, NDVI, kernel density are a few that you learned in class)
* Display a minimum of 2 vector layers
* Use of queries and/or geoprocessing tools, describe in the write-up what you used.
* Final map(s) should be professional! All required elements are present. Text is free from misspellings.
* Provide a minimum one page write up using double-spaced, Times New Roman font with citations in [APA format (Links to an external site.)](https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html). Use the questions below as a guide.
  + Describe the purpose of your map. Did you have a specific audience in mind when you created it?
  + Where did you obtain your data?
  + What were the tools or analysis techniques that you used?
  + Did you run into any issues for this project? If so, how did you overcome them?
  + Did you learn anything new while creating your project?

Turn in your completed map(s) (.pdf, .jpeg, .png) and write-up in MS Word format (.docx) here.”

Grading Rubric Criteria

* Student utilized problem solving techniques in a structured manner in the completion of a major project or application in Geographic Information Systems. (30 points)
* Produce a quality final report/drawing using standard tools and techniques. (20 points)
* Use appropriate software in a major project. (20 points)
* Map layout effectively describes/illustrates the purpose of the map or problem to be solved. (30 points)

**GISC 2335 Programming for GIS: Final Project**

Description:

“To wrap-up this course, you will need to complete an individual project that uses Python automation to make some GIS task easier, faster, or more accurate; just as you might need to do in your GIS career.

The goal of your project is up to you but is preferably one that relates to your current field of work or a field in which you have a personal interest. You're expected to define the requirements from the beginning. The number of lines of code you write is not as important as the problem you solved.

For project approval, write a proposal providing the following:

1. The task you intend to accomplish using Python;

2. How your proposed solution will make the task easier, faster, and/or more accurate;

3. The deliverables you will submit for the project; a well-documented script tool is highly encouraged. If the script requires data, describe how the instructor will be able to evaluate your script; possible solutions are to zip a sample dataset for the instructors or make the script flexible enough that it could be used with any dataset.”

Grading Rubric Criteria

* Describe and understand basic programming for GIS applications. (15 points)
* Perform programming for GIS customizations. (25 points)
* Script/program is free from syntax, logic, and runtime errors. (20 points)
* Script/program results are as expected per the project's description. (40 points)

**GISC 2331 Advanced Problems in GIS: NDVI Study Project**

Description:

“This project involves an NDVI (Normalized Difference Vegetation Index) study of an agricultural area near your area of interest.  It is similar to the NDVI exercises you did in 2402. If you need a refresher on the steps to follow, you can relaunch the [Processing Raster Data Using ArcGIS Pro](https://www.esri.com/training/catalog/57e19a8eed0f3a861c100985/processing-raster-data-using-arcgis-pro/) or [Change Detection Using Imagery](https://www.esri.com/training/catalog/57630431851d31e02a43ee33/change-detection-using-imagery/) tutorials.

1. Decide on your area of interest, then download the Landsat 8 multispectral images for 2 different dates. It may be helpful to select a date during the growing season and another date during winter or a time of drought.
   * Recall that [NDVI values close to 1.0 (Links to an external site.)](https://earthobservatory.nasa.gov/features/MeasuringVegetation/measuring_vegetation_2.php) indicate lush vegetation (ex. rain forest).  NDVI values close to 0.0 and negative values indicate non-vegetative land cover.  We are primarily interested in vegetation but want to see a little of your area of interest also.
2. After performing the NDVI steps on your imagery, create your map, focusing on what you are trying to show (vegetative health). You may choose to create a map showing a before/after example of vegetation (ex. agricultural land in winter vs. summer) or digitize the focus area and provide statistics as you did in the Change Detection Using Imagery tutorial. It's up to you.
3. Identify and add some vector features; counties, roads, etc. to help orient the reader. Extra features are important but avoid crowding.
4. Export your finished map as a PDF.”

Grading Rubric Criteria

* Student utilized problem solving techniques in a structured manner in the completion of a major project or application in Geographic Information Systems. (30 points)
* Student used correct data provided for the exercise or downloaded from the appropriate source identified in the instructions. (30 points)
* Map layout effectively describes/illustrates the purpose of the map or problem to be solved. (40 points)