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**I: GISC 2311.WORKPLACE GEOGRAPH INFORMATION SYSTEMS (GIS) AND
GLOBAL POSITIONING (GPS) (2-4-3)45.0702**

Course Description: Application of GIS technology to real-world workplace applications from public and private sectors. Completion of Global Positioning System (GPS) field work required for lab exercise. Prerequisites: GISC-1311, GISC-2420, GISC-1421 and GISC-2301 or permission of the instructor.

Course IDEA Objectives

Essential: Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course.

Essential: Learning to apply course material (to improve thinking, problem solving, and decisions.

Essential: Learning to analyze and critically evaluate ideas, arguments, and points of view.

Important: Learning how to find and use resources for answering questions or solving problems

II: SCANS (Secretary's Commission on Achieving Necessary Skills) competencies are integrated into these course competency-based outcomes to improve your education by helping you better define and use work place skills needed for employment. Each competency will integrate several scans competency to assist you in developing and reinforcing employable skills. Competencies are criterion reference (i.e. they are measured against predetermined levels of proficient in skill for effective job performance).

The know-how identified by SCANS is made up of five workplace competencies and three foundation skills that are needed for solid job performance. These are:

- **Workplace Competencies** – Effective workers can productively use:
 - Resources** – They know how to allocate (C1) time, (C2) money, (C3), materials, and (C4) staff
 - Information** – They can (C5) acquire and evaluate data, (C6) organize and maintain files, (C7) interprets and communicate, and (C8) use computers to process information.
 - Interpersonal skills** – They can (C9) work on teams, (C10) teach others, (C11) serve customers, (C12) lead, (C13) negotiate, and (C14) work well with people from culturally diverse backgrounds,
 - Systems** – They (C15) understand social, organizational, and technological systems, (C16) they can monitor and correct performance; and (C17) they can design or improve systems.
 - Technology** – They can (C18) select equipment and tools, (C19) apply technology to specific tasks and (C20) maintain and troubleshoot equipment.



- **Foundation skills** – Competent workers in the high-performance workplace need:
 - Basic Skills** – (F1) reading, (F2) writing, (F3) arithmetic and (f4) mathematics, (f5) listening and (F6) speaking.
 - Thinking skills** – (F7) to think creatively, (F8) to make decisions, (F9) to solve problems, (F10) to visualize, (F11) the ability to learn, and (F12) to reason.
 - Personal Qualities** – (F13) individual responsibility, (F14) self-esteem, (F15) sociability, (F16) self-management, and (F17) integrity.

III: Learning Outcomes / Job Skills

The student will be able to analyze problems, visualize solutions to problems, design and modify programs logic to create workable computer programs or map projects.

- **Course competencies – Through class interaction reading materials and individual and group study, and laboratory assignments the student will be able to:**

- A. explore a GIS map and get information about map features
- B. preview geographic data and metadata
- C. add data to a map
- D. describe the structure of a GIS map
- E. explain how a GIS represents real-world objects
- F. change the way features are drawn on a map
- G. access feature information in different ways
- H. describe spatial relationships of map features
- I. describe how GIS can be used to solve problems
- J. create map symbology
- K. identify which real world features are represented with vector or raster
- L. reference data to real world locations
- M. using digitizing; create GIS data and create a map using the data
- N. edit GIS data
- O. use a GPS to collect positional data
- P. use software Excel, Access, and Notepad to create dbf files
- Q. Get started with GIS Analysis for the applications of environmental GIS, parcel based GIS, business GIS and emergency response.
- R. Identify GIS spatial tools to answer questions to identify what is near by, Identify what is far, Identify distances and locations, Identify what is adjacent and Identify elements in common.
- S. Introduced to basic modeling tools.
- T. Design maps using the principles of size, scale, color and audience.
- U. Write and present reports about maps and geoprocessing using the correct GIS vocabulary, the documentation requirements for a GIS project.
- V. Identify three map projections, Mercator, UTM and WGS84
- W. Participate in team project



•**Instructional Strategy – To facilitate mastery of above listed competency. The instructor will be responsible for:**

1. Students participate in projects created for each of the objectives above.
2. Exams contain a written and a practical section.
3. Providing guided practice
4. Eliciting performance
5. Providing feedback
6. Assessing performance
7. Enhancing retention and transfer of knowledge

•**Evaluation: Student assignments – To demonstrate mastery of the competency listed above, the student will be responsible for:**

- 1 Completing and achieving a passing grade on unit tests and examinations.
- 2 Attending class, attention to lectures, and completing required reading and on-line materials.
- 3 Completing and submitting assigned projects and homework by due dates.
- 4 Class and group laboratory participation to demonstrate mastery of GIS database use, working with spatial data, use of raster data, and integration of raster data to GIS georeference database.
- 5 Students maintain a journal of the GIS maps created.
- 6 Students participate in a group GIS project. With guidance the students collect the data, create the GIS features, produce the Geoprocessing Map document, print a hard copy map and write a report.
- 7 Capstone project for each student. The capstone requires the students to participate in a self directed GIS team project. The students prepare a report and present the results to the class using Power Point.
- 8 Completing and achieving a passing grade in a comprehensive final examination.

• **Additions to Course Goals (Learning Outcomes (LOs) based on Key Activities (KAs) under Critical Work Functions (CWF) in the Geographic Information System (GIS) Technician Skill Standards identified by the GIS Advisory Board with cooperation from Del Mar College. The skill standards (AEKS Matrix) were recognized May 22, 2007, by the Texas Skill Standards Board (TSSB).**

1. Define the data requirements, research sources of available data, and purchase data from reputable source. KA1.1
2. Develop (and document with metadata) database(s) including: defining geometry, attributes, relationships, topology rules, feature behaviors such as types and domains, incorporating data schema models. KA1.2
3. Determine data compatibility (projection), perform data conversion, populate feature attributes. KA1.3
4. Perform both tablet, COGO, and on-screen digitization with attribution. KA 1.4
5. Collect field attribute and location data via GPS (Tablet PC/PDA). KA1.5



6. Geocode data. KA1.6
7. Perform quality control (QC) and quality assurance (QA) of GIS databases. KA1.7
8. Scan hard copy images into digital format. KA2.1
9. Geo-reference digital imagery. KA2.2
10. Rectify images to meet data standards. KA2.3
11. Perform image analysis (classification) KA2.4
12. Develop procedures and schedules for data maintenance. KA3.1
13. Maintain data QA/QC through update operations: (add/delete/change) KA3.2
14. Perform data layer updates and update metadata (imagery/themes). KA3.3
15. Convert data between formats. KA3.4
16. Perform database performance tuning through compression, indexing, etc. KA3.5
17. Conduct Spatial/Non-Spatial Analysis KA4.1
18. Create scripts KA4.2
19. Preprocess geographic data (generalize, subset). KA4.3
20. Perform geo-processing through clipping, buffering, overlay, etc. KA4.4
21. Generate descriptive and spatial statistics. KA4.5
22. Perform quality control and assurance. KA4.6
23. Interpret data results. KA4.7
24. Create maps. KA5.1
25. Create analysis report. KA5.2
26. Create tables KA5.3
27. Create charts. KA5.4
28. Generate mailing labels, logos, posters, etc. KA5.5
29. Distribute digital and hard copy products. KA5.6
30. Define user software needs and determine application design format (hardware platform and programming language). KA6.1
31. Create customized software application solution. KA 6.2
32. Create map templates. KA 6.3
33. Perform quality control and assurance for applications, such as beta testing. KA6.4
34. Create help files and support documentation. KA 6.5
35. Establish data custodianship and distribute and assign database permissions according to organizational policy. KA 7.1
36. Organize file structure (e.g. create directories, perform data and directory housekeeping) KA7.2
37. Perform data maintenance through archival functions. KA 7.3
38. Resolve user technical problems KA 8.1
39. Install and maintain software including service packs. KA 8.2
40. Assist in writing technical guides for GIS applications. KA 8.3
41. Provide technical training for end-users. KA 8.4
42. Create formal and informal communications using email, phone, listservs and written reports. KA9.1
43. Coordinate GIS projects including cost estimates, timelines, and budgets. KA9.2
44. Prepare and maintain contracts. Maintain equipment and office supplies. KA 9.3
45. Provide internship supervision for students and new workers. KN 9.4



- 46. Participate in GIS awareness events such as presentations, conferences and user groups. KA9.5
- 47. Participate in professional conferences using both oral and written communications. KA10.1
- 48. Continue professional education through credit and/or noncredit courses, technical training and informal education, such as online courses. KA10.2

IV: Relations of Learning Objectives to SCANS Competencies

• Competency-based Outcomes with Workplace Proficiency Levels

| | Resources | | | | Information | | | | Interpersonal Skills | | | | | | Systems | | | Technology | | |
|---|-----------|----|----|----|-------------|----|----|----|----------------------|-----|-----|-----|-----|-----|---------|-----|-----|------------|-----|-----|
| | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 | C17 | C18 | C19 | C20 |
| A | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 4 | 2 |
| B | 3 | 1 | 3 | 1 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 2 | 3 | 2 | 4 | 2 |
| C | 3 | 1 | 3 | 1 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 2 | 3 | 2 | 4 | 2 |
| D | 2 | 1 | 2 | 1 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| E | 2 | 1 | 2 | 1 | 4 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| F | 2 | 2 | 2 | 1 | 4 | 3 | 3 | 4 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 3 | 4 | 2 |
| G | 3 | 3 | 3 | 1 | 4 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 3 | 4 | 2 |
| H | 2 | 2 | 2 | 1 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| I | 3 | 2 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| J | 3 | 2 | 3 | 1 | 4 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| K | 3 | 2 | 3 | 1 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| L | 2 | 2 | 2 | 1 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| M | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| N | 2 | 1 | 3 | 1 | 1 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| O | 2 | 1 | 3 | 1 | 1 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 4 | 2 |
| P | 2 | 1 | 3 | 1 | 1 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| Q | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| R | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| S | 2 | 1 | 3 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| T | 4 | 1 | 3 | 1 | 4 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| U | 3 | 1 | 3 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| V | 2 | 1 | 3 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |
| W | 2 | 1 | 3 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 4 | 2 |



•Competency-based Outcomes with Foundation Skill Level

| | Basic Skills | | | | | | Thinking Skills | | | | | | Personal Qualities | | | | |
|---|--------------|-----|-----|-----|-----|-----|-----------------|-----|-----|------|------|------|--------------------|------|------|------|------|
| | F 1 | F 2 | F 3 | F 4 | F 5 | F 6 | F 7 | F 8 | F 9 | F 10 | F 11 | F 12 | F 13 | F 14 | F 15 | F 16 | F 17 |
| A | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 |
| B | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |
| C | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |
| D | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |
| E | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |
| F | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| G | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 |
| H | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| I | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 |
| J | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| K | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| L | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| M | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 |
| N | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| O | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| P | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| Q | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| R | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| S | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| T | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| U | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| V | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |
| W | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 |

Proficiency Level for the SCAN Competency Relations Tables

- 1 – rarely performs task
- 2 – routinely performs task w/ moderate supervision
- 3 – routinely performs task w/minimum supervise
- 4 – routinely performs tasks
- 5 – routinely performs task over/beyond designation task