DEL MAR COLLEGE **CS/IT DEPARMENT-VB 113**
101 Baldwin, CC TX. 78404 **(361) 698-1299**

I: GISC-2420.INTERMEDIATE GEOGRAPHIC INFORMATION SYSTEMS: CARTOGRAPHY AND GEOGRAPHY IN GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND GLOBAL POSITIONING SYSTEMS (GPS)(3-3-4)45.0702

Course Description: Introduction to the principles of cartography and geography. Emphasis on global reference systems and the use of satellites for measurements and navigation. Students gain greater cartographic skills in presenting information using ArcGIS software. Student use the GPS data collection using the Trimble Geo XM and ArcPad software. **Prerequisites: GISC 1311, work experience or consent of the instructor.**

Course IDEA Objectives

Essential: Gaining factual knowledge (terminology, classifications, methods, trends)
Essential: Learning fundamental principles, generalizations, or theories.
Important: Learning to apply course material (to improve thinking, problem solving, and decision making).
Important: Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course.

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 competencies to assist you in developing and reinforcing employable skills. Competencies are criterion referenced (i.e., they are measured against predetermined levels of proficiency in skills 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) interpret 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 (17) 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

Learning outcomes

A. Explain the basic concepts of accuracy, precision, and scale in GIS/GPS,
   a. recognize discrepancies in data presentations;
   b. evaluate data before a transform for scale and accuracy.
B. Summarize GPS data collection procedures,
C. Describe the operating environment for GPS,
D. Critique existing paper maps for the six components that all maps should have,
E. Critique the features, color, legend and on paper maps.
F. Classify existing maps by user application,
G. Identify three applications that use Vector data to solve spatial problems,
H. Prepare a paper and present a PowerPoint on Cartographic Design principles.
I. Use the Analysis of Networks concepts an create geospatial solutions to
   a. solve the problem of Emergency Response.
   b. provide the best ordering in delivering merchandise
   c. highways and provide other routes
   d. Establish service area for business solutions.
J. Locate existing software or scripts that will provide solutions to geoprocessing activities.
K. Download a script from ESRI that will calculate distance between two points.
L. Download a script from ESRI that will convert DDMMS to decimal degrees for use in the field data exercises.
M. Perform Field Data collection Using the GEOXP and ARC PAD .
N. Measure "real world" distance and area on maps and correctly relate the two;
O. Acquire geographic information directly using GPS and merge it with existing information; and manage the geographic information in a dynamic database situation.
P. Display spatial attributes using charts
Q. Enhance your cartographic skills using map styles, labels and annotation

- **Instructional Strategy** - To facilitate mastery of above listed competencies, the instructor will be responsible for:
    1. gaining student's attention
    2. informing student of objectives
    3. stimulating recall of prior knowledge
    4. presenting new material
    5. providing guided practice
    6. eliciting performance
    7. providing feedback
    8. assessing performance
    9. enhancing retention and transfer of knowledge
- **Student Assessment** - To demonstrate mastery of the competencies listed above, the student will be responsible for:
    1. Completing and achieving a passing grade on unit tests and examinations demonstrating mastery of logic structures, basic concepts of programming, and mastery of an introductory level skill in a modern computer language.
    2. Completing assignments to demonstrate mastery of geospatial skills and appropriate use of symbology.
    3. Class and group laboratory participation to demonstrate mastery of geospatial project development.
    4. Completing and achieving a passing grade on 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. Collect field attribute and location data via GPS (Tablet PC/PDA). KA1.5
    5. Geocode data. KA1.6
    6. Perform quality control (QC) and quality assurance (QA) of GIS databases. KA1.7
    7. Geo-reference digital imagery. KA2.2

8. Perform data layer updates and update metadata (imagery/themes). KA3.3
9. Conduct Spatial/Non-Spatial Analysis KA4.1
10. Create scripts KA4.2
11. Preprocess geographic data (generalize, subset). KA4.3
12. Perform geo-processing through clipping, buffering, overlay, etc. KA4.4
13. Generate descriptive and spatial statistics. KA4.5
14. Perform quality control and assurance. KA4.6
15. Interpret data results. KA4.7
16. Create maps. KA5.1
17. Create analysis report. KA5.2
18. Create tables KA5.3
19. Create charts. KA5.4
20. Distribute digital and hard copy products. KA5.6
21. Define user software needs and determine application design format (hardware platform and programming language). KA6.1
22. Perform quality control and assurance for applications, such as beta testing. KA6.4
23. Organize file structure (e.g. create directories, perform data and directory housekeeping) KA7.2
24. Create formal and informal communications using email, phone, listservs and written reports. KA9.1
25. Coordinate GIS projects including cost estimates, timelines, and budgets. KA9.2
26. Participate in GIS awareness events such as presentations, conferences and user groups. KA9.5
27. Participate in professional conferences using both oral and written communications. KA 10.1
28. 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	2	1	2	2	2	2	2	2	3	3	1	2	2	4	1	1	1	2	3	2
B	3	1	3	1	3	3	3	3	3	3	1	2	1	4	3	3	1	2	3	2
C	3	1	4	3	2	2	2	2	3	3	1	2	1	4	3	2	1	3	3	2

D	3	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	1	3	3	2
E	3	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	1	3	3	2
F	3	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	1	3	3	2
G	3	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	1	3	3	2
H	3	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	1	3	3	2
I	3	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	1	3	3	2
J	2	2	2	2	2	2	2	2	3	3	1	2	1	4	2	2	2	2	2	2
K	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3
L	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3
M	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3
N	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3
O	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3
P	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3
Q	2	1	2	2	2	2	2	2	2	3	1	2	1	4	3	2	1	3	3	3

- **Competency-based Outcomes with Foundational Skills 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	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
B	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
C	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
D	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
E	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
F	2	3	2	2	3	2	2	3	2	3	3	3	3	4	4	3	4
G	2	2	2	2	3	2	2	2	2	2	2	2	3	4	4	3	4

H	2	2	2	2	3	2	2	2	2	2	3	3	3	4	4	3	4
I	2	2	2	2	3	2	2	2	2	2	2	2	3	4	4	3	4
J	2	2	2	2	3	2	2	2	3	3	2	3	3	4	4	3	4
K	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
L	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
M	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
N	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
O	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
P	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4
Q	2	2	2	2	3	2	3	3	3	3	3	3	3	4	4	3	4

Proficiency Levels for the Scan Competency Relational Tables:

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