In this issue:

Business Geographic Information Systems - A Course in Business Geomapping

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This issue is on the Internet at **http://isedj.org/4/52/**

EDSIG activities include the publication of ISEDJ, the organization and execution of the annual ISECON conference held each fall, the publication of the Journal of Information Systems Education (JISE), and the designation and honoring of an IS Educator of the Year. • The Foundation for Information Technology Education has been the key sponsor of ISECON over the years. • The Association for Information Technology Professionals (AITP) provides the corporate umbrella under which EDSIG operates.

Business Geographic Information Systems A Course in Business Geomapping

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Abstract

This paper discusses the importance of Geographic Information Systems (GIS) in the business curriculum. During the Summer II, 2004 term, work began on the development of a course in geomapping fundamentals. The course was made possible with an internal technology development grant at Angelo State University (ASU). The proposal was to develop a new geomapping course at ASU that would blend both business management and marketing courses to enhance current theorems taught in each curriculum. The course would be of special interest to students majoring in managing information systems, computer science, physics, mathematics, education, management, marketing, and agriculture.

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1. INTRODUCTION

There has been significant growth in recent years in the use of Business Geographic Information Systems (BGIS) for analysis and problem solving. And, less than 10 percent of business schools have geographic information systems (GIS) available in the classroom for students in any discipline. (Murphy, 1996) Applications of the technology have been made in marketing research, retail trade area analysis, site selection, real estate development, and land use planning, land value assessment, media targeting for advertising, and transportation planning. BGIS research in universities has resulted in the publication of numerous BGIS-related articles in publications such as the *MIS Quarterly* and *Journal of MIS*.

However, few universities offer courses in the application of BGIS as a tool for business analysis. (McNally, 1999) The technology can also be applied in other disciplines such as public health, geography, biology, psychology, history, agriculture, and others. Only a few of these disciplines provide exposure to BGIS and spatial data analysis, while most provide no exposure at all. In many cases, even management information systems (MIS) majors graduate exposure to this technology.

Until recently, only a handful of business schools are beginning to respond to incorporating Geographic Information Systems (GIS) into their management business curriculum (Boasson, 2004). This paper will discuss how the basic concepts of GIS were applied to a multidisciplinary audience with an interest in data visualization to analyze and display data and create information for planning and decision making. The students were taught how to store, manipulate, assemble, and display a map, and extract information from data that were referenced spatially. The paper is arranged as follows: firstly, provide an overview of why GIS and business should co-exist in a business school curriculum, summarize why a GIS course was developed in the business discipline,

2. GIS and BUSINESS CURRICULUM

The size of the GIS marketed –estimated at $1.1 billion in 1995 (Daratech, 1995) – highlights the importance of this technology

as a decision support tool. Students must learn to capture data, manipulate data, and manage data that will ultimately support data analysis and decision making (Mennecke, 2004).

GIS and Internet technologies are moving closer together (Krumme, 2005). And the combined use of computer mapping, Internet-and data base-technologies and location-allocated modeling techniques are a particularly important (set of) skill(s) for many undergraduate students whose first jobs after graduation involve real estate, urban demographic, retail, marketing, environmental, transportation and international trade and investment analyses.

Business geomapping assist in the analysis of locational qualities, labor markets, marketing, potential risk exposure, social economic and environmental impacts and global trade potentials (Ibid, 2005).

Information Technology (IT) and management information system educators address many decision making processes in the IS curriculum (see www.is2002.org) that includes sections on DBMS products: recent developments in database systems, IS Management, Decision Theory, Fundamental Organizational Functions, and Information and Business Analysis to name a few. All are important components of that curriculum.

However, recent developments in IT and GIS underscore an urgent requirement to incorporate this important technology in the business curriculum. Literature in the management information field (MIS) is rich with descriptions of decision support technologies that can be applied to GIS. For example, Spague (1980), Turban (1995), and others have provided a framework of understanding the nature and role of decision support technologies.

Similar decision support subsystems exist in GIS despite its importance as a stand alone technology. And, recent advances made by the Open GIS Consortium (OGC) suggest that the powerful distribution of corporate assets utilizing customer relationship management (CRM) systems and enterprise resource planning (ERP) systems will incorporate a standard for enterprise wide geospatial databases (Limp, 2005). Incorporating the extraordinary power of GIS technology into the business curriculum is such that it is rapidly becoming an emergent requirement in any serious program that deems to be current (Boasson, 2004)

3. OBJECTIVE

The objective of this project was to develop a business geographic information systems (BGIS) course. The BGIS course provided the students with the knowledge and skills to utilize spatial information in a wide variety of business and organizational applications. Students that completed the BGIS course were expected to:

- demonstrate understanding of fundamental BGIS principles,

- be prepared for entry-level jobs or career advancement in BGIS-related fields,

- develop verbal and written communication skills in presenting BGIS findings, and

- learn problem-solving skills utilizing problem-solving software.

4. OVERVIEW

The BGIS course emphasized the interdisciplinary application of this technology to make sound business decisions. The design and development of the course was not to develop BGIS experts, but rather to expose the technology to business students and other majors and to educate them about its use. The focus, therefore, was on using simplified desktop mapping software suitable for demographic and business analysis.

The course provided an introduction to business geographic information systems (BGIS) to students. The students learned how to use software to analyze various technical problems in various types of organizations including business, government, military, not-for-profit, and others.

The objective was to develop the course during the summer of 2004 and offer it as a special topics course (MGT 4381) during the 2004-2005 academic years. The course was taught in the Fall semester 2004. The course success (as measured by enrollment and student feedback) gave basis to add the course to the university curriculum and teach the course on a rotational basis.

The new course in BGIS is clearly an effort to provide innovative new technology to ASU students that enhanced the student performance and provided insight to their major field of study.

5. COURSE DEVELOPMENT

During the course development process a decision was made to utilize BGIS as a technology to interpret demographic trends, manage resources, and model trends. Student learned how to manage spatial data within a relational data base management system utilizing hands-on projects. Upon completion of the course students were able to:

- assist direct marketing efforts, understand distribution logistics, plan merchandising, and develop site selection schemes

- demonstrate competitive analysis that in turn reduce the competitive threat and enable one to understand the relationship between competitors.

- pinpoint the a profitable location

- utilize trade area analysis to understand where customers are coming from

- demonstrate how financial service organizations analyze property management systems, and to identify regulatory compliance, risk management, target marketing and branch locations

- introduce distribution planning by effective routing of products from the warehouse to distributor.

- analyze the demography of any region to ensure a business targeting the right customer base

- assisted in network maintenance in fields of insurance, municipal planning, disaster management, emergency services, public safety, census analysis, land use profile, and environmental planning.

- how to lower overhead costs, etc.

The course development contains multiple contexts for the student; their pace of development is largely determined by three considerations:

- ability to structure and manipulate multiplying sources into useful information,

- development of computer software to handle different classes of geographic problems,

- and prospects for disseminating developments in spatial data handling.

6. COURSE APPLICATION

The semester was divided into two segments. The first six weeks focused on the specialized Arc View 3.3 Business Analysis software. This software is utilized by leading corporations, universities, and business schools for the purpose of business analyst. The Arc View Business Analyst ESRI Business Information Systems Higher Education Master Lab software (25 seats) and was purchased with funds from Higher Education Assistance (HEAF), 2003 for $4,595.98.

A dedicated MIS lab with state of the art computers seating 32 was available as an open lab for four hours a week in addition to normal class time. The lab was staffed with both a Research Associate (two hours) and a Teaching Assistant (two hours) to assist the students.

Seven PowerPoint lectures were developed to supplement documentation associated with the BGIS software. Tutorials and supplemental course material (data files, etc.) was furnished on CD ROM). The CD-ROMs were used extensively during the first six weeks of class. After the sixth week students were required to successfully complete three exercises to demonstrate that they have an adequate skill set to proceed.

During the second segment of the course the students were divided into groups. Each group was assigned on three case studies. Each group developed three reports for presentation to the class. During the final week of the semester the students were required to present an independent project demonstrating their competency in the software and mastery of BGIS.

Finally, the course was developed for Internet web interactivity. The syllabus (Appendix 1) was built as an Internet hyperlinked document and placed on an Angelo State University (ASU) server. All information, including links to specific downloadable databases, supplemental material applicable to the case studies, and readings from

other websites was downloadable from this Website at anytime.

7. CONCLUSION

In conclusion, as noted by several creditable information science forecasters, there will be a continued interest in business geographics and spatial analysis. The experts (AAG, 1996) predict that as software becomes more user friendly and on-line data more plentiful, it will be imperative that business students be educated about spatial information and its value. GIS is a computer-based technology capable of running multiple scenarios and options efficiently and rapidly (Boasson, 2004). It assists businesses and governmental entities to make informed decisions and measure the impact of decisions. It is a tool to offers business a decision support tool to improve decision making. It is strongly felt that the popularity of this course will expand at Angelo State University in the near future.

The future of GIS in government and industry is clearly dependent on the availability of trained professionals who work at various levels to design, operate and manage the implementation of GIS. As GIS applications become more diverse it will become increasingly important that education opportunities address new demands for education and training. Certificate programs can address this need by linking courses in logical sequences tied to specific objectives. However, regardless of the resources available, successful certificate programs must receive guidance and support from professional and academic GIS organizations (Wikle, 1998)

8. REFERENCES

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Appendix 1

Angelo State University

MGT 4381.020
Geomapping Fundamentals
Fall - 2004
Steve Reames, Ph.D.

Note: This is an Internet interactive syllabus - please click underlined items

PREREQUISITES

None

CREDIT HOURS

3 Credit Hours

OFFICE AND PHONE

Room: RAS 207
Tel: 325-942-2383 Ext. 233
E-mail: sreames@angelo.edu
Office Hours: MW   9-12 pm. TThr 8-9:30 am

These are my official office hours, but the door is open. I enjoy teaching, and I enjoy talking to you, so if you have questions that we did not answer in class, or if you want to explore an idea, come by. The best time to catch me is right after my afternoon class or Friday's. If I am not in the office, leave a note at the secretary's desk in Room B-100 and they will place your note in my office mail; I will get back to you as soon as possible.

COURSE DESCRIPTION

This course is designed to provide students with an introduction to the theory and capabilities of Geographic Information Systems (GIS). GIS has gained center stage in both government and the business world and plays a major role in a wide range of activities from transport and urban planning, natural resource assessment and natural hazard mitigation planning, to market research and retail site selection. Geomapping Fundamentals-MGT4381 will combine the study of general GIS principles with practical applications that are designed to answer questions concerning the social and physical sciences and business. It will introduce students to basic procedures associated with manipulating; analyzing and displaying spatially referenced data and will provide the theoretical background needed to use GIS efficiently and productively.

This course shows, with practical examples, how geographic analysis is relevant to business and teaches you the basics of working with a geographic information system

(GIS). You'll work with ArcView 3.3 and with the ArcView extension module Business Analyst 1.1. Each of these will be the primary software used for the purpose of this course. The student will learn how to create a study area, use the data from the CD-ROMs included with Business Analyst, add and analyze your own business data, create trade areas, locate potential customers and competitors, and create reports and maps. And you'll see how you can customize and get more functionality out of Business Analyst with Avenue scripts and ArcView extensions.

Students require no prior exposure to GIS; however elementary knowledge of computer use (making files, directories, copying files etc.) is expected.

Audience

This course is designed for anyone who owns and wants to learn how to use ArcView 3.3 and ArcView Business Analyst 1.1

Note: This course was developed for ArcView Business Analyst 1.1, which shipped with demographic and household data for 1999, as well as five and 10-year projections. If you are using ArcView Business Analyst 1.1a or updated data for 2000, you can complete the course exercises but some of your results may differ from the exercises.

EXTENDED DISCRIPTION

These days, virtually all geographic analyses of business and planning problems are solved using Geographic Information Systems (GIS). The goal of this course is to teach you how to solve those problems with GIS.

It's easy to talk about GIS but it's much harder to *do* it. This course won't do you any good if you just know that someone can do such-and-such an analysis. What counts is that *you* can do it. Don't get me wrong – theory counts too – the analysis is no good if the theory is wrong, but what counts in this course are start-to-finish, completed applications.

This course is almost wholly case studies and exercises. We will read about, and implement, a lot of different problems using a lot of different data sets. You will emerge from this course with very useful skills to do a wide range of problems.

Another thing that counts in GIS is presentation. Chapter 1 *of ArcView GIS Means Business* says that GIS is really good at helping people think by producing maps, graphs, tables, and text that convey your analysis and results to a reader. I will therefore require you to write polished, completed reports that you should be proud to put in your portfolio so you can show potential employers what you can do.

REQUIRED TEXT AND MATERIAL

Harder, Christian. ArcView-GIS Means Business, Environmental Systems Research Institute, Inc., Redlands, California ISBN 1-879102-51-X

- 3 1/2 "HD diskettes (1 ea.) **or** 100 MB Zip Disk
- SCANTRON Form No. 882-ES (4 ea.)

COURSE WEBSITES

MIS Server	From anywhere – Web access
ESRI's Virtual Campus	This is the homepage for ESRI's Virtual Campus. It contains information on how to register for the *Basics of Arc GIS* course, which constitutes the first component of this course. It includes instructions on how to order a student version of ArcView 8.1 software.
ESRI's Jump Station **Great Net Sites**	GIS and BG jump station sites
Geography Network **ESRI's Data Site** **Geospatial and Statistical** **Data Center**	Collections of GIS and BG data
Business Geographics **Directions** **GeoPlace**	These are the sites for important trade journals in this field.
Jobs	This site contains information on career opportunities in GIS and BG

Other useful information can be found on and off campus. Off Campus (web based):
http://mis.angelo.edu/Geomapping/MGT4381_syl_sched_Fall2004.htm   On Campus:
J:\ClassroomData\Management and marketing\sreames\Classes\MGT4381-Geomapping
Note: Under this link there are copies of all PowerPoint lectures, ArcView Exercises/Data, and links to other interesting GIS sites.

COURSE OBJECTIVES

- perform basic ArcView GIS tasks
- prepare a study area for analysis
- display your customers, competitors, and businesses on a map
- determine the trade areas of your businesses
- locate your best customers, identify their demographic characteristics, and find other areas with people like them
- calculate market penetration
- evaluate potential business sites
- create routes
- create standard and custom reports
- create presentation-quality maps
- customize the ArcView Business Analyst interface.**COURSE GOALS**

Course goals lie beyond objectives. They are the nuggets in the pot of gold at the end of the rainbow; not always immediately attainable, but always worth working toward. Let's hope by the end of the semester, we all will have a good understanding of data communications and how it impacts our society, and we will be aware of the most important industry trends.

CLASS ATMOSPHERE

Any true discussion or application of hands-on laboratory assignments involves personal exposure and thus the taking of risks. Your ideas and application may not jibe with your neighbor's yet as long as your points are honest and supportable; they need to be respected by all of us in the classroom. Encouragement, questions, discussion, and laughter are a part of this class, but scoffing is never allowable, just as disruptive behavior is grounds for dismissal.

CLASS ATTENDANCE

Class attendance is required and a class roll will be taken during each class period. Learning is an active process, and it is simply impossible for you to participate if you aren't here. Your participatory attendance is important to achieving the learning outcomes.   If non attendance occurs you will be responsible for materials covered during your absences, and it is your responsibility to consult with me. Your overall semester performance grade will be lowered if you do not participate in the class without an approved excuse (E). After 4 days of non-attendance, your performance grade will be lowered. The key here is to communicate problems to me. You will find I am very understanding and will work with you to achieve your term goals.

TARDINESS

When you make an appointment with a friend, you expect him or her to be on time. Your employer, too, depends on you to arrive promptly each day.   Occasionally, you may find it necessary to be late. In that case, I would certainly prefer that you come after we have started rather than miss the entire hour. However, tardiness should never develop into a pattern. Students are counted absent after a half-hour of tardiness. This will impact your overall performance

grade at semester end. If you do not notify me at class end to remove the "A" for your marked absence and replace the mark with a "T" for tardy, then the absence will become a matter of record and your overall performance grade will be lowered. I consider four (4) tardies as one full absence.

WITHDRAWAL

It is the responsibility of the student to officially drop or withdraw from a course. Failure to officially withdraw may result in the student receiving a **grade of "F"** in the course. If you decide to drop the course, please discuss this with your instructor before taking this step.

EVALUATION

Grading will occur through a point system. There are 500 points available for this course. Given the philosophy of the course, the grading will be on the successful completion of the ESRI Basics of Arc View CD tutorial, three exercises, two examinations (one of which will constitute the course final examination), and an individual project.

As with each course I teach, all final grades are based on regular attendance, class participation, completion of all assignments, and exams. However, as a guideline, for grading will be generally measured as follows:

>= 450 points	A
400 - 449	B
350 - 399	C
300 - 349	D
<= 299 points	F

READ ME FIRST

ArcView Tutorial--- Expected

The first six weeks of this course you will carefully follow the Arc View CD ROM tutorial provided with your text and listen to several lectures. Until you learn the basics of Arc View via the tutorial you will be unable to successfully complete the remainder of the course. BEFORE PROCEEDING you must successfully complete and turn in proof of your skill set.   To assist you further, you may **supplement** the CD ROM tutorial by working through the online assignments provided by ESRI Arc View.

BEFORE PROCEEDING TO A TEAM WORK PROJECT YOU MUST SUCESSFULLY COMPLETE AND TURN IN THIS ASSIGNMENT

TEAM WORK PROJECTS -------------------------3 projects @ 50 pts ea.= 150 pts

During this course you will be divided into groups and asked to collectively work toward a given outcome (please note "Team Work Project Requirements" below. The projects will be preceded by a hand -out. They team projects are outlined below.

PROJECT#	Activity	Due Date

1.   Market Assessment

Formal presentation is expected (I.e.- PowerPoint, hand-outs for audience, poster boards, etc.
Presentation week of Oct. 25th

2. Customer Profiling/Prospecting

Formal presentation is expected (I.e.- PowerPoint, hand-outs for audience, poster boards, etc
Presentation week of Nov. 15th

3. Market Area and Site Selection

Formal presentation is expected (I.e.- PowerPoint, hand-outs for audience, poster boards, etc.
Presentation week of   Nov 22nd

TEAM WORK PROJECT REQUIREMENTS

1. Projects are completed by team peer work groups. Work groups are expected to follow Total Quality Management (TQM) model of team leadership.
2. Projects should follow provided examples, supported with research material and/or charts, formal computer presentations are encouraged.
3. All projects require the use of a personal computer with Internet access.
4. All assignments are to be submitted and/or presented on the assigned date. Late work will be penalized by 20% of the grade per class session it is late.

STAGE EXAMS------------------------------2 Exams @ 100 pts ea.= 200 pts

Two times during the semester an exam will be administered over information in the text on particular chapters. Exam number two will constitute the final examination.

Exam #1 – Chapters 1, 2, 4, 9, and12   Exam #2 (Final) – Chapters 3, 5, 6, and 10

Please note: the chapters covered by the exams do not necessarily follow in the order of the text, so you will need to refer to the syllabus and schedule for the content of each stage exam. Make-ups exams will not be allowed on any exams. Please adjust your schedule to accommodate these exams. You will need to furnish a Scantron (ES882) to take the exam. The exam will consist of 100 questions: 50% multiple choice and 50% True/False questions over the text chapters noted in the schedule.

INDIVIDUAL PROJECT --150 pts

The project will go something like this. During the first half of the semester (and continuing into the second half) we will be working with tutorials, listening to short PowerPoint, reviewing resources, and working in teams. For your Individual project, you can select a project that appeals to you and reproduce it but with your own unique data set. The case studies you'll read about in your text and does not have data attached – they just tell you about the problem and walk you through its solution. A source of ideas for the course individual project will be the sample individual projects found on the "J" drive of the university computer network. You may use one of the sample projects and apply it to utilizing a different data set and in a different spatial location. For example, instead of doing a marketing study for a jewelry store in Dallas, you could use the same methods to do a study for a drugstore in St. Louis.

For the final project, you will have to obtain the data, do the analysis, and present the results to the class using PowerPoint. This is not a read-about-it term paper, but a do-it project. The projects will be graded on the quality and complexity of the problem you undertake, the quality of your analysis, and the quality of your output (a report, maps, and a class presentation).

Extra Credit ---Up to 30 pts available

The tutorial, team work project, and individual projects will keep you busy during the semester. However, if you would like to earn additional credit for this course then you may do so, up to 30 pts. There are a series of Sample Individual Projects-15 total available for you to successfully complete. Each sample project is valued at 2 points each. You may turn these in to me anytime during the semester up until the day of your final presentation.

PLAGIARISM

Plagiarism is deliberately handing in another person's material as your own. It is stealing. It belittles you. Please refer to the "Angelo State University Student Handbook". Outlined therein are the Texas State University System, Board of Regents-Rules and Regulations. Please note section 5.3-Academic Dishonesty. This university policy will be strictly enforced in this class. Specifically, all work turned in must be your original work. Plagiarism, copying, cheating on a quiz or test or other assigned work will not be tolerated. Any evidence of plagiarism, copying, cheating on a quiz or exam or other assigned work will result in a double zero on that assignment (that is, an assignment or test that would normally count for 10 percent of the grade will be counted as 20 percent zero if plagiarized). Any evidence of repeated plagiarism, copying, cheating on a quiz or test or other assigned work will result in an F for the course and reported in writing to the university Provost/ Vice President of Academic Affairs for disciplinary action.

ADA STATEMENT

Angelo State University is dedicated to providing the least restrictive learning environment for all students. The college district promotes equity in academic access through the implementation of reasonable accommodations as required by The Vocational Rehabilitation Act of 1993, Title V, Section 504 and the Americans with Disabilities Act of 1990 (ADA) which will enable students with disabilities to participate in and benefit from all post-secondary educational programs and activities.

COURSE CONTENT AND SCHEDULE
MGT4381 – Fall, 2004

WEEK   **MODULE**   **EXERCISES**

Introduction to ArcView GIS Course from ESRI ArcView Tutorial Disk

30 Aug   Course Overview   The Basics - Sec. 1
                           Lecture#1: Intro

6 Sept   Querying Data   Querying Data - Sec. 3
                           Lecture#2: Getting Started

13 Sept   Working with Tables   Working with Tables-Sec. 4
                           Lecture#3: Maps and Numbers

20 Sept   Analyzing Spatial Relationships Analyzing Spatial Relationships-Sec. 5
                           Lecture#4: Getting A Map to CPU

27 Sept   Presenting Information   Presenting Information-Sec. 6
                           Lecture#5: What is Where?

4 Oct   Creating Your Own Data   Creating Your Own Data-Sec. 7
                           Lecture#6: Business Analysis For Whom

Business Geographic Applications

11 Oct   Getting GIS Data for Business Applications   Market Assessment –
                               Team Work Project #1
                           Lecture#7: Business Analysis Tasks

18 Oct   Managing Commercial Real Estate   Market Assessment –
                               Team Work Project #1

25 Oct   Researching Retail Markets   Customer Profiling/Prospecting
                               Team Work Project #2
                           Presentation - Market Assessment Team Work Project #1 Due

1 Nov   Increasing Newspaper Readership   Customer Profiling/Prospecting
                               Team Work Project #2

8 Nov   **Exam**: Chaps. 1, 2, 4, 9, and 12 Market Area and Site Selection
                                                                Team Work Project #3

15 Nov   Finding New Banking Opportunities   Market Area and Site Selection –
                               Team Work Project #3
                           Presentation - Customer Profiling/Prospecting Team Work Project

#2 Due

22 Nov   Realigning Sales Territories   Individual Projects
                           Presentation - Market Area and Site Selection Project #3 Due

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29 Nov	Evaluating Site Suitability	Individual Projects
6 Dec	Tracking Vehicles Automatically	Individual Projects

Presentation - Individual Projects Due and all sample extra credit projects are due

13 Dec   Final Exam: Chaps. 3, 5, 6, & 10 Thurs, Dec. 16th 8-10:00 a.m.