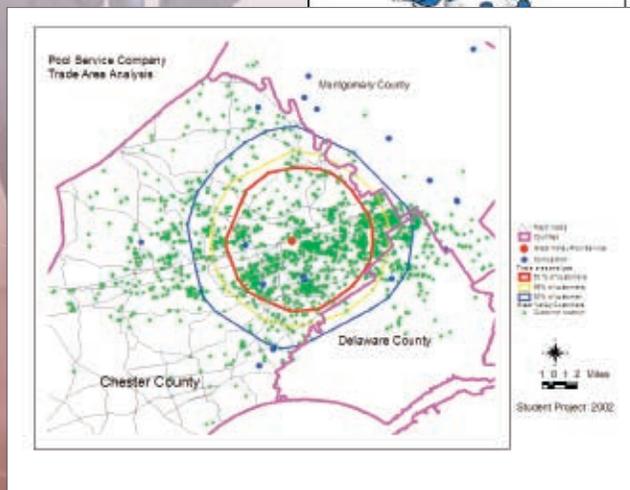
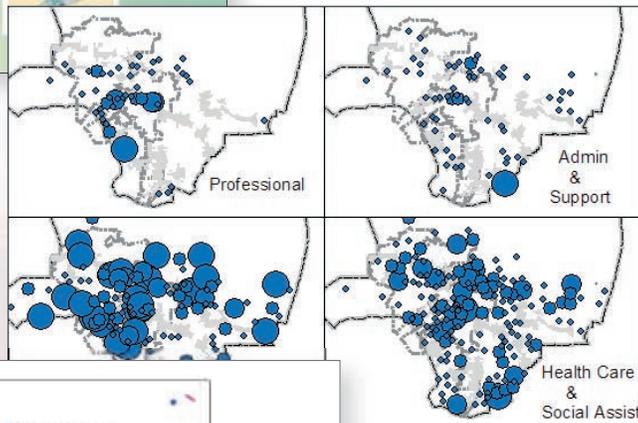


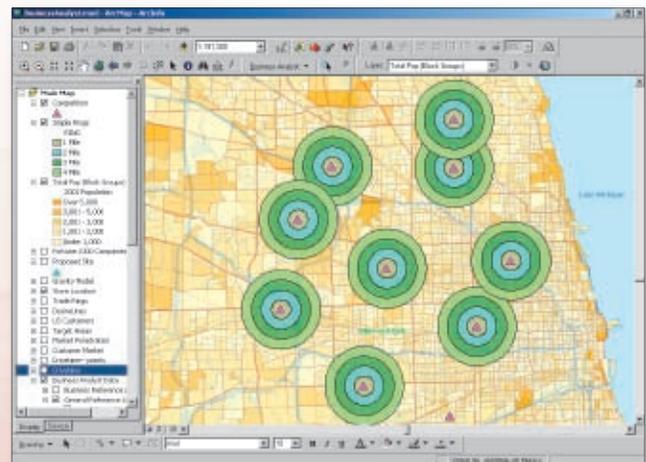
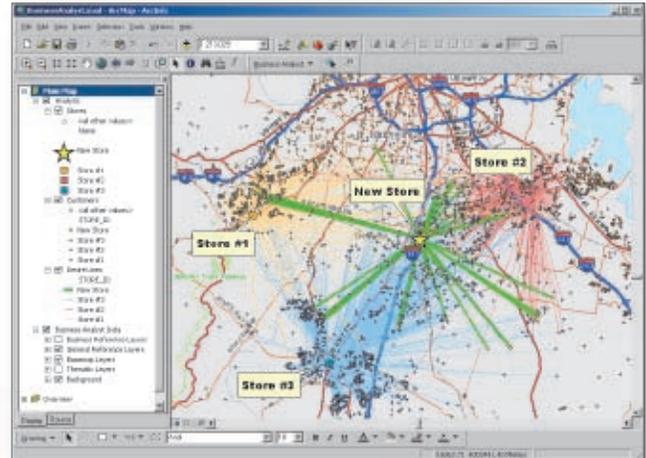
# Approaches to School of Business GIS Programs



# Approaches to School of Business GIS Programs

Business students need geographic information system (GIS) technological skills to analyze the geographic elements of business science. GIS technology has progressed to a high level of sophistication and, therefore, has been introduced into nearly every emphasis of the business major. The rapid evolution of GIS as an analytical tool has created specific applications for multiple vertical industries. Its acceptance as a strategic component of information technologies and incorporation into the central systems of many enterprises has been driven by both analytical capacity and competitive edge.

Although most colleges have GIS in their computer labs, few schools of business offer their undergraduate and graduate students opportunities for emphasis in business geography technologies. In the face of industry demand for qualified business geospatial analysts, some universities are still debating the validity of GIS in an accredited curriculum while others are trying to determine how to position this new field of study within their programs. A few schools offer business geographic programs that include GIS technologies. Each of these programs is born from unique environments that influence pedagogical styles. This study presents five cases that exemplify varied approaches to GIS programs in college schools of business.



# University of Pennsylvania—Wharton School

Founded in 1881 as the nation's first collegiate business school, the Wharton School at the University of Pennsylvania is dedicated to creating the highest value and impact on the practice of business and management worldwide. This mission is carried forward by Wharton's GIS program that extends the possibilities of GIS beyond its own gates.

In 1992, ESRI donated a copy of ArcInfo® to Wharton. It was so well received that in 2000, the school acquired an ArcView® site license and set up a state-of-the-art GIS lab for the school. A major convenience store chain was interested in the potential of GIS and sought Wharton's help in providing spatial analysis for site location. Partnering with businesses has become one of Wharton's distinguishing characteristics. Students used GIS to devise solutions for site analysis that took into account traffic flow, traffic directions, area businesses, demographics, and so forth. The retail project proved a major success for Wharton, and remunerations from the project enabled the lab to add ArcSDE® to its GIS capabilities.

Susan Wachter, professor of real estate and finance, is founder and director of Wharton's GIS laboratory. Wachter's vision is global rather than fixed on the school itself. Wharton's mission is to "impact world enterprise through the generation and dissemination of business knowledge and the development of leaders." The coalescence of Wharton and Wachter's vision has opened up many more opportunities for student experience and success. Furthermore, this outreach philosophy is serving to introduce possibilities about GIS technology to the business community.

Wachter says, "The private sector is increasingly adopting GIS using public sector created geographic data. The use of GIS in the days after the September 11, 2001, terrorist attacks underscores the urgency for developing GIS as a national resource. To accomplish this, input from business, academia, and government organizations is critical."

As a step toward achieving this goal, Wachter convened a conference at Wharton in 2002 titled *The Expanding Role of GIS in Business and Government*. Participants included leaders from academia, government, nonprofit organizations, and business. The conference brought renowned speakers such as the chief geographer of the United States Census Bureau, Bob Marx. Apart from exploring the many uses of GIS and the challenges ahead, the conference was a structured effort at achieving closer alignments between academic research institutions such as Wharton, GIS data creators and users, and government officials.

Students benefit greatly from this type of community forum. Says Wachter, "As we develop our business partner program and hold conferences, our students have access to much more than textbook learning. We have students coming to our school with a background in geospatial technology. Some are coming having done work that is important in this industry."

Expectations are high, and Wharton's GIS program is driven as much by students as by outside demand. Students who bring to class their own research industry experience are highly motivated to push information technology to the next level in their own fields. Wharton has more than 4,000 students in its business programs and, of these, more than 1,600 are in the MBA program and 190 in the doctoral program. Among its academic departments are business and public policy, insurance and risk management, finance, management, marketing, operations and information management, and real estate.

The lab's GIS faculty employs modeling technology to analyze commercial and residential real estate development and price appreciation patterns in cities. GIS research students have used the lab to develop a hybrid spatial autocorrelation model of home pricing for the greater Philadelphia, Pennsylvania, area. Students use the facility to design projects for business applications, public policy applications, economic research, and much more.

Wachter emphasizes, "The vision is that our students need to be at the edge of the leading technology across the board. Our academic philosophy is to be partners with businesses and work with them on emerging technologies." The effort of the school going out into the business community and linking the real world to academia is the Wharton signature. Student case studies, therefore, are coworks between business students and business managers. Wachter concludes, "The lab is a hands-on facility where we work on solutions with industry. If we work with industry, then we understand industry needs. This contact enables us to know what we need to be teaching and what goals we need to be striving toward for the future."

# University of Wisconsin, Eau Claire

A regional campus of the University of Wisconsin, Eau Claire has always had a strong liberal arts tradition. The university still maintains its liberal arts axis while hosting other disciplines including a business school and a school of nursing. Studies in GIS technologies are not new to the campus. Since the early days of GIS development, the department of geography has been teaching this technology. Today, almost every geography class at Eau Claire has at least one GIS technology component, and the number of GIS curriculum modules increase in upper division classes. GIS technologies are centered in the geography department at Eau Claire. The well-established department enjoys a strong rapport with the school's other departments by offering training in spatial applications for many fields including the School of Business. Students seeking a combination of GIS and business skills are encouraged either to major in geography and minor in business or to obtain a double major.

The department of geography at Eau Claire offers an emphasis on urban economics and uses GIS business applications in that program. The university graduates about 20 students a year from this program. The department of geography also works with the School of Business to integrate GIS into business course work when possible. The faculty sees GIS as a necessary tool for geographers, believing that combining spatial analysis with business is not just to develop strong business students, but also to train good geographers. Most of these students, however, get jobs in the business field.

Brady Foust, professor in Eau Claire's geography department, says, "We primarily want to educate students to think spatially, so we encourage training students in geography first and business second. We offer an urban economic business GIS track, which produces some good economic geographers." Foust believes that students have to be strong urban and economic geographers before they can effectively start to apply GIS in business. "The only way you can deal with spatial problems is through GIS. The reputation of the program is growing among students because these spatial analysis skills are getting people jobs," adds Foust.

Student feedback to the administration has been tremendously helpful in the development of the school's GIS program. Administrators realize that GIS is not just a fad—it is an integral tool of business sciences. Demand is growing because people in business are seeing GIS capability in spatial analysis as an applied science, which can be used routinely by various industries. Companies want people trained in both GIS and spatial analysis working for them.

Resource materials for GIS in the business classroom have not kept up with the demand for instruction. Foust says, "Not many textbooks are available. I have to create my own projects." Foust is a senior partner in Matrix Research, which is a GIS consulting company. He has also started a new company called Proxix Solutions, a market intelligence company that provides advanced geospatial solutions to businesses. Because of these authentic experiences and contacts, Foust has real-world business projects to draw on for classroom applications. He says, "From a professor's point of view, it is important to both talk the talk and walk the walk. Students like real-world examples because somebody's actually done it."



Foust explains his pragmatic classroom approach. "I teach a course called Business Geographics. It is based on real-world projects that I have done in the past working with actual companies. They are tremendously useful because they represent the types of situations that students will face when they go out and get a job. Although I do teach theory, my curriculum is predominantly applied and project oriented."

Computer labs support classroom activities. One campus lab is a dedicated GIS lab that houses 20 stations. In other labs across the campus more than 150 machines also have ArcGIS® licenses. This access has made it easy for students to complete homework and special projects. The increased number of students using GIS, however, has raised the demand for lab seats. The GIS software is affordable, but getting the hardware is a challenge so the school has applied for many grants.

Along with a proposal for increased funding comes a new plan for the GIS lab layout. The proposal envisions a facility wherein the instructor stands in the middle of the room to see what every student is doing. In addition, a dedicated screen on the wall will be tied to the instructor's console, so the instructor can respond directly to individual student's exercises. In addition, monitors would be situated on the walls directly in front of the students' machines; thus, students would not need to turn around to see the instructor's demonstration. They simply would look at the overhead screen in front of them and then, with minimal eye aversion, replicate the action on their own machines. The school of geography at Eau Claire, fortunately, received a substantial endowment, which has been timely for fulfilling this proposal.

Other developments that Foust would like to see added to the GIS program include a course that focuses specifically on database management skills that engender strong spreadsheet ability. Another goal is to add classes that develop cartographic design expertise. Foust says, "A good cartographic design really can make or break a project. A course in production cartography can help students make graphics come alive. We are fortunate to have an incredibly gifted production cartographer who could create such a course. He is able to make a map both look good and tell its story correctly."

Students from the school are receiving excellent placements. They have obtained jobs at large operations such as Target, Walgreens, Best Buy, and Federated Department Stores. They have found jobs in smaller companies as well. Companies are pulling these new employees into various types of decision making projects such as marketing ventures. "Graduates report that they are happy with the GIS training they received at Eau Claire," says Foust. Admittedly, employee development also comes from on-the-job training. Because students understand the concepts, the particulars of the job are easier to learn.



*Students working in an old style lab format*



# West Chester University, Pennsylvania

The geography and planning department of West Chester University (WCU), is part of the School of Business and Public Affairs. West Chester University's long history of computer mapping dates back to the era of mainframe computers. Throughout the years, students and alumni have influenced the development of the program into its current structure.

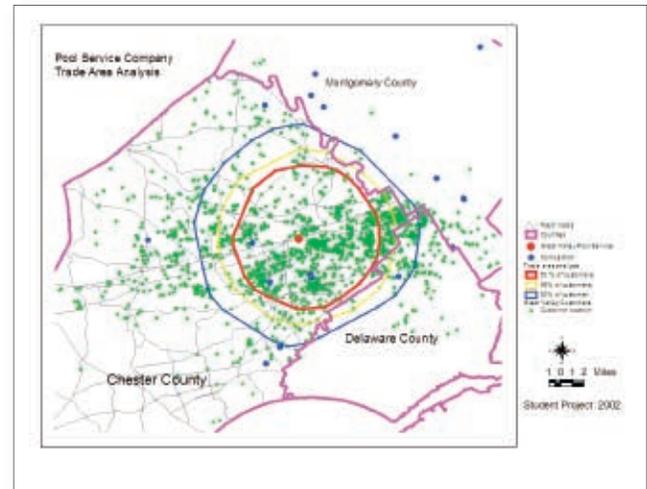
In the early 1970s, administrators developed a planning and public affairs program that included courses in government planning, public administration, criminal justice, and social work. All these courses have administrative and geographic components. The marriage of WCU's Department of Public Affairs to the School of Business created a home for the waning geography department, serving to revitalize it. This reorganization has brought a significant advantage to the geography department, because the business program is well funded and resources are distributed in proportionately larger allocations to the School of Business than they traditionally are to the College of Arts and Sciences.

In return, the department of geography brought computer technology to the School of Business in a new way and could tap finances slated for innovative technologies. In the early computer mapping years, equipment and software costs nearly made geospatial technology out of reach for students. With support from ESRI and university administration, the program was eventually able to gain a foothold. The relationship between WCU and ESRI has remained strong over the years. Students can now avail themselves of quality GIS labs.

The dean during WCU's early technological era, Dr. Linda Fletcher, was a GIS enthusiast as is her successor, Dean Christopher Fiorentino, Ph.D. His encouragement has been crucial for the development of WCU's business GIS program. An enthusiastic faculty has been key in getting students excited about GIS technology. John Tachosky, Ph.D., and Wesley Thomas, Ph.D., have planned and grown a GIS lab program that supports business

applications. ESRI's software support has also been essential. But the most significant influence has come from students who have been instrumental in formulating the program. Business majors taking geography courses have been quick to see the potential of GIS in locating target markets and drawn to design projects that combine these disciplines.

Wesley Thomas, director of WCU's GIS lab, describes past student influences, "The hands-on technology was fun, and students were pleased with the beautiful projects they were producing. Through word-of-mouth student interest grew. The dean, business faculty, and geography faculty began to design courses that would meet students' growing demand. Phase one



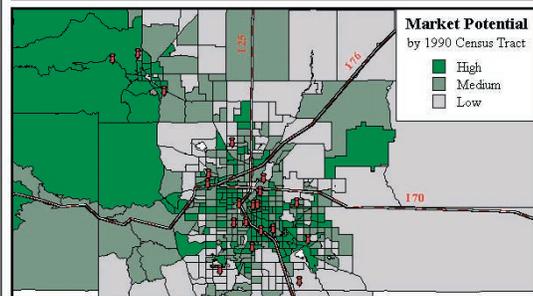
was to build a bigger computer lab. Phase two was to design a business GIS course. Originally the course was offered as an elective and then became a requirement for undergraduate marketing majors. Phase three was the university's response to students' request by offering a minor in business geographics."

Current enrollment in WCU's School of Business and Public Affairs is approximately 2,000 undergraduate students and 400 graduate students. Undergraduate business students can take introduction and advanced courses in GIS that cover data sources and analysis techniques used in the planning process with an emphasis placed on appropriate applications. Undergraduates can minor in business geographics with courses that include *Introduction to Management Information Systems*, *Basic Geography GIS*, *Business Geographics—Beginning*, and *Business Geographics—Advanced*, *Systems Analysis*, *Database Management*, and *Decision Support Systems*. At the graduate level, students can take GIS courses that require them to complete several projects and labs, make presentations, and critique student projects.



## Map of Sporting Goods Stores around Denver Colorado Area

Overlaid by Market Potential Per Census Tract



GIS used in Business is call [Business Geographics](#)

A full computer lab with more than 25 GIS dedicated computers supports GIS business classes. The lab offers a variety of GIS software options, so students are prepared for a variety of system environments. The lab also supplements the university's Center for GIS and Spatial Analysis. Because of the success of the business GIS minor program, the school faces staffing problems. Keeping a full-time lab assistant is not easy because companies pay more for this expertise than the school does.

The faculty that facilitates GIS is feeling stretched by the demand. Business school faculty members who are not fluent in GIS are reluctant to learn GIS technology. Thomas says, "Perhaps faculty members are afraid that they are not going to be able to learn it and become embarrassed. They are high achievers, so they are hesitant about venturing into new territory. Members of the marketing faculty have been more willing than management faculty to take the first steps." This attitude may be attributed to market location theory taught in the marketing discipline, so GIS applications are an accepted necessity.

Thomas believes that stronger GIS classroom resources could help reduce teacher anxieties by providing support materials. He says, "Today's management information systems textbooks are a full package that come with automated test banks, complete lessons, Web pages with volumes of data, software, and many case studies. These textbook programs make teaching a class much easier. The business GIS field lacks these rich resources. A comprehensive business GIS textbook needs to be designed. It should be specific. For example, if the class lecture is about coordinate conversion, a corresponding chapter should have a complementary exercise supported with project data. If the concept of address geocoding is taught, a lesson that does address geocoding should be included. Class lessons should be gradual in their levels of difficulty. Once students get a taste of success, they will work confidently as lessons become more rigorous."

WCU GIS business students receive applied training. Students learn about GIS tools and functions, do address geocoding, work with census and cluster segmentation data, and create and publish maps. The instructor focuses on the unique qualities of a good map. Students are provided with data for completing a variety of exercises. Instructional materials contain many graphics to help students easily follow exercises. The teaching model also involves spending one class per week in lectures and one class in the laboratory where the lessons are demonstrated.

Students have worked on projects that have benefited the local community. For example, a project for site placement of Mercedes Benz dealerships saved that company millions of dollars. Based on research from GIS students, the dealership completely restructured its marketing strategy. Students have also helped local banks and small businesses. Thomas says, "We are analyzing demographics, looking at traffic flows, and using GIS to simulate transportation distances. In the advanced course, we use ESRI's ArcLogistics™ Route software to create fleet routes, schedules, and reports. The students learn by doing."

GIS projects effectively demonstrate successful outcomes. West Chester University administrators often turn to the school's GIS business classes for student projects that show off the technology the university is teaching its students. The university gains valuable publicity from student successes, which helps the school on many levels.



# University of Redlands, California

GIS has been part of the school curriculum for years. The University of Redlands (U of R) offers a bachelor of science in information systems. Included in this track is the class *GIS Managing Environmental Problems*. Because of the school's longtime relationship with ESRI, the university is ahead of most other schools in adopting GIS into curriculum structures. The U of R's School of Business offers 10 different subdisciplines to its undergraduates. GIS has expanded within the school to become part of five of those subdisciplines, and it continues to influence more of them.

Academia has tended to move slowly in recognizing geography's applications to other curricula. One reason is because geography departments traditionally rooted in the school of social sciences have not been actively accessible to other fields. Business students have a hard time understanding the value of geography and frequently lack the rudiments to begin to understand basic geographic concepts. Faculty members in the school of business may feel deficient in their own geography training and unsure about introducing the science into their courses.

Because most business occurs in geographic locations, the application of GIS dovetails into nearly every subdiscipline within the School of Business. Recognizing GIS as a viable science, the U of R has built a Master of Business Administration program that includes a GIS emphasis—currently, the only such program in the country. Required courses include *Geographic Information Systems in Policy and Business*, *GIS for Marketing*, *Geographic Analysis of Global Business*, and *GIS and Strategy Implementation*.

James B. Pick, Ph.D., describes the School of Business attitude about GIS, "We see GIS as part of decision science because in the business world GIS supports decision making." Instead of teaching a separate spatial science emphasis, courses are constructed to conjoin spatial science and business concepts. For example, rather than simply offering product dispersion as a topic for a software exercise in the computer lab, theories about market diffusion in metro areas can be explored in the context of both business theory and spatial analysis.



Pick recommends that an MBA program's GIS emphasis introductory course include rudimentary coverage of geographic and spatial science concepts. "The average business manager is going to have very little foundation in geographic science. These students most likely lack an understanding of projections, coordinate systems, and basic cartographic concepts. Their last geography courses may have been way back in high school if they had any at all. This is a challenge for business schools. In our required GIS course in the information systems program for undergraduates, about one-sixth of that course focuses on geography fundamentals. It is good for business students to reach out to this social science discipline and learn something about it. Geography expands their horizons," says Pick.

Another concept that needs transforming is that of GIS simply being a technological tool. "This is difficult to change because the tool concept, understandably, has been reinforced by GIS associated technologies, specifically location-based services and global positioning systems," says Pick. These are impressive geographic technological functions, but they do not have the same decision-based characteristics offered by GIS. Nevertheless, the branding has been done, and teachers frequently see GIS as a commercial product rather than a viable applied science.

GIS, however, does have merit as a science because it is strategic. It supports marketing research and analysis, logistics, management science, operations and information systems, and international business. In the current era of social responsibility, GIS even crosses the study of ethics.

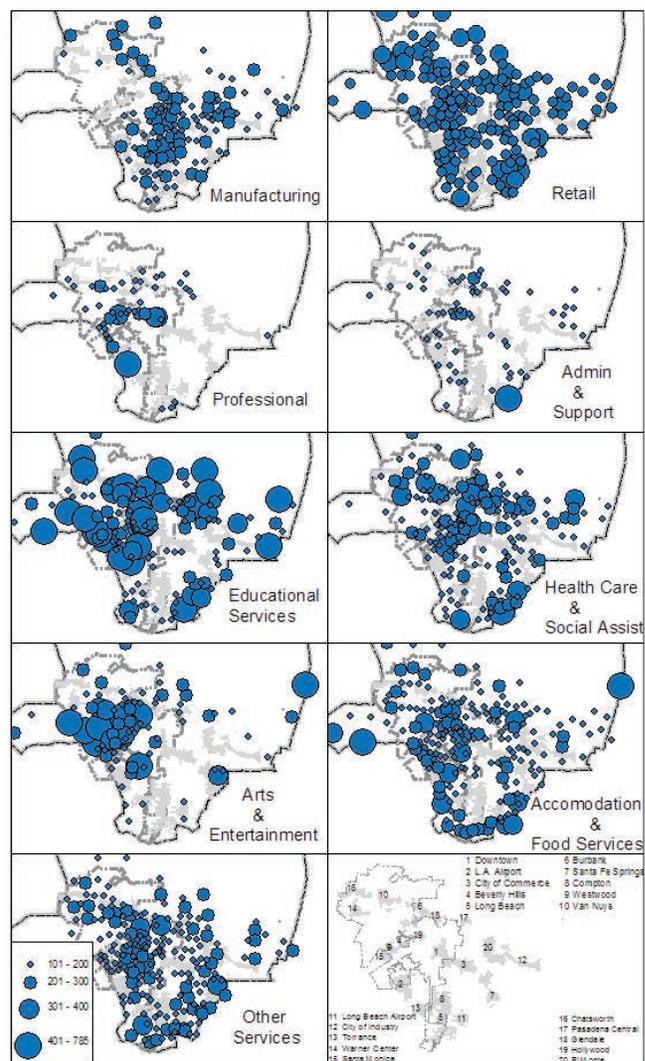
Students benefit from GIS as a science concept. "Our approach is an interactive enhancement," explains Pick. "Rather than the program making students overly GIS specialized, the program leverages them into another level of professionalism. In the work arena they will apply GIS based on a stronger management background. Even those students coming through the information systems program with some GIS understanding have an advantage. Our newly hired students, who are not yet senior managers, have found that their companies foster an interest in GIS."

"Graduates of the MBA program will have advantages at the middle management or upper middle management levels in their fields. They will enlighten upper management about the business potential of GIS and will be able to foster GIS initiatives in their companies. Our information systems students have shared that they have been included on study teams in their companies that have adopted or expanded GIS. Managers realize that our students understand something about GIS and have pulled them into decision making projects," concludes Pick.

A challenge for curriculum development is lack of textbook materials. The science of GIS in business, as yet, is an open field for academic research and scholarly writing. In 1994, David J. Grimshaw published a textbook titled *Bringing Geographical Information Systems into Business*, wherein he describes the shift in GIS from being an information systems tool to becoming a mainstream tool for the business environment. In 2002, David Boyles published *GIS Means Business*, a short book of case studies that also incorporates concepts of Web-enabled GIS. James Pick is publishing papers through America's Conference on Information Systems conference proceedings, and he published a case studies book titled *GIS in Business* that was released in August of 2004.

Writings about business and GIS are scant. Inarguably, increasing the textbooks available will stimulate the growth of GIS in business curricula. Students' successes in the business world, in turn, foster changing perceptions in the academic world because they offer the fodder for the development of case studies. Thousands of cases of successful GIS implementations and solutions exist for scholars to research and write studies.

The university's GIS program is well established because of strong support from its president. In addition, the U of R has been fortunate in its relationship with ESRI, and university administration has come to embrace GIS as a viable component of school offerings. The School of Business is hiring a tenure track teacher specifically for its GIS emphasis.



# Nova Scotia Community College, Centre of Geographic Sciences



Nova Scotia Community College, located in Lawrencetown, Nova Scotia, houses the Centre of Geographic Sciences (COGS). With 20 years of experience, COGS has earned an international reputation for its programs in GIS, remote sensing, and surveying. Seven years ago, it began a GIS for Business advanced diploma program. COGS added the program in response to a rapidly expanding business practice of using spatially related information for business decision making. This program is open to qualifying students holding a bachelor's degree.

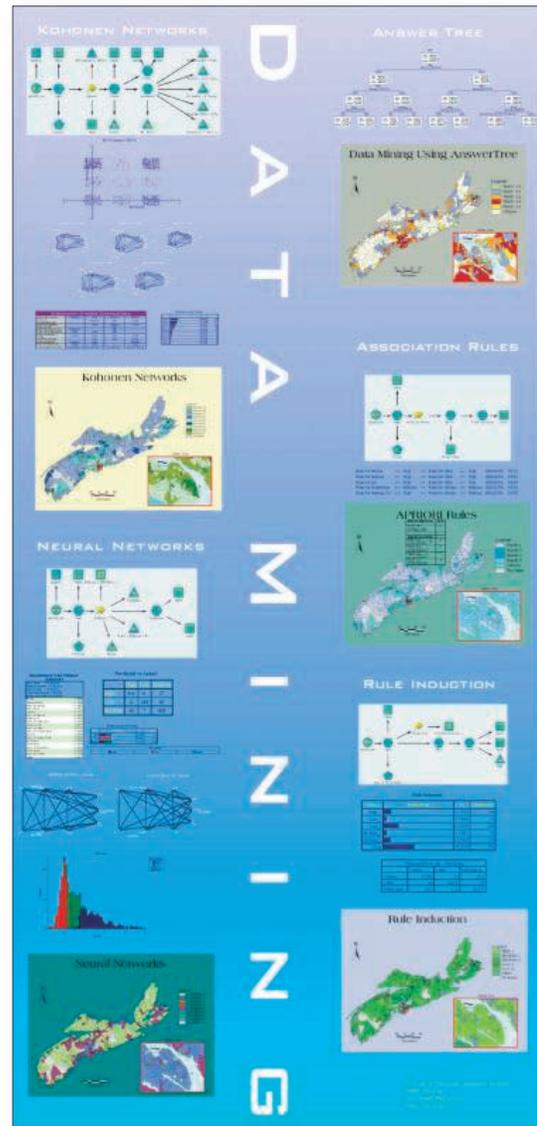
Classes for the program include geomatics-related technologies, such as GIS and global positioning systems (GPS), as well as other computer-related technologies, for example, database management systems and multimedia systems, which have GIS and Internet programming components. The GIS for Business advanced diploma program focuses on developing research skills using GIS that is applied to business topics (trade area, customer profiles, market segmentation, market potential, and site selection). Students perform geospatial analysis using methods of spatial interaction modeling, network analysis, and location-allocation modeling.

COGS' program is rigorous, but the students are up to the challenge. Many students come to the program with some previous GIS experience. Lawrencetown is a rural town far from urban distraction, so students remain focused on their studies. This is necessary because what some consider a two-year program is offered in just one year.

Brad McCallum earned his GIS for Business advanced diploma from COGS in 2000 and now works for ESRI supporting the use of GIS in business. He explains the value of his COGS training, "The COGS program ingrains students with a deep understanding of GIS technology. My work experiences have shown me that a person must have an understanding of the technology to take full advantage of GIS. As I work with businesses, I realize that most people think of GIS as colors on a map, so they do not understand its value. I continually find myself educating people in the business community by showing them that GIS is more than simple mapmaking. It has in-depth capabilities for sophisticated analysis. With my training, this is something that I can convincingly do using a company's own data."

Dr. Konrad Dramowicz, who began teaching at COGS in 1989, has administered the GIS for Business advanced diploma program since its launch in 1997. Dramowicz says, "Students take a set of courses that include theory and technology. The location analysis course, for instance, gives students training in spatial modeling, location decisions, and strategic planning. Optimal location strategy decisions are supported by GIS technology." Other courses offered include statistical methods, serving maps on the Internet, data mining, and much more.

In conjunction with class projects, Nova Scotia Community College has a portfolio development requirement. Students must complete the components of the portfolio as part of their course requirements. Students can later use their portfolios as career management tools.



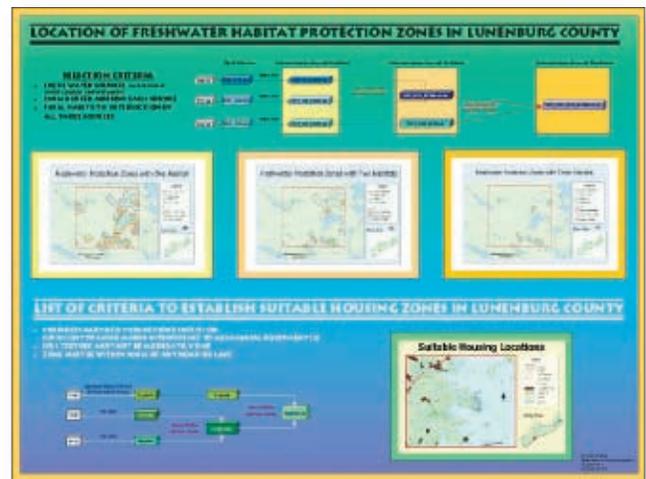


Computer laboratory facilities are readily available at COGS. Dramowicz boasts, "Basically everything we request we get. We have almost as many computers as students, so students can always find computers available in the lab. Our computers are licensed with ESRI products. Labs are open every day until 11:00 p.m. Our program is very intensive. On a Sunday evening at 10:00 p.m., you can find a lot of students working in campus labs."

The intensive work pays off for students. Dramowicz adds, "It is easy for them to gain employment shortly after their graduation. Our students normally are hired within just a few months of graduation and start at pretty good salaries." Prestigious companies, such as Royal Bank of Canada, Canadian Imperial Bank of Commerce, ESRI, AT&T, and Canada Housing and Mortgage Corporation, have employed COGS students who have earned the GIS for Business advanced diploma.

Sponsors from international, national, and local businesses provide resources for student projects in GIS business courses. In addition, the faculty has created a CD-ROM with electronic books that provides students' reference materials for major projects and assignments. Actual data for doing projects is not as easily attainable for business projects as it is for environmental projects. This is because of confidentiality and privacy issues. Rules in Canada restrict the availability of data about individual customers, so it is difficult to get real data. Although students sometimes have access to real data, they often use fictitious data for their projects.

The COGS program stresses the development of technological skills. McCallum's experience is that data mining is critical for success, but users must first have a solid understanding of technology fundamentals before applying GIS to data. McCallum explains, "GIS offers many different options for getting an end result. Knowing the potential of the technology allows users to plan a project that considers the variables that data brings to the task. It is critical to have variables make sense when they are finally spatially connected."



# Getting Started With GIS at Your Business School

What can you do to add GIS to the offerings of your business school? The primary reason these five schools were successful in implementing and sustaining a successful GIS in their business programs is the perception by administration, faculty, and students that GIS is a viable discipline for business science. Geographic information technology has been very successful in the past decade in bringing new applications to business science. However, while it has been tried and tested in multiple industries, it has yet to be implemented in many colleges' business curricula. Nevertheless, models are in place for schools that plan to incorporate GIS in their business programs.

Attitudes about the placement of GIS within the academic institution are still being formulated, but more often than not, ownership lies outside the business school. Regardless of the department or departments in which GIS is seated, facilitators who actively offer accessibility to the technology to a wide scope of disciplines have a broader opportunity for applications and, hence, benefit. Schools of business lacking GIS resources have been proactive in seeking them through interdepartmental cooperation, grant writing, and the development of community relations with area businesses.

Pedagogical approaches differ between schools. Some focus more on developing GIS technological skills; others focus more on analysis within the body of business science. Both approaches blend technology and science, but the balance of emphasis varies, as does the use of class materials and project types. On one hand, formulaic approaches that use tried and proven data and projects geared for success allow students to learn a wide range of applications. On the other hand, real-world projects offer a comprehensive view of how GIS seats itself within the organization and introduce the student to project management experience.

All the schools listed here were frustrated by a lack of textual resources for classroom support and research projects. The faculty at these programs generated the majority of their own curriculum materials. There is a need for business case studies, shared data for research projects, and business community relationships. Some schools broaden students' experiences and networks by hosting seminars and conferences.

Success in all the schools in this study was a result of strong administrative support. Proponents of GIS for business education face the task of both formulating and changing the positions of administrators, faculty, and students about the advantages GIS brings to business sciences. Attitudinal change frequently comes by creating awareness. The tactics employed by the schools in this study for changing institutional opinion include demonstrating GIS applications for business, communicating industry demand for GIS-trained employees, rallying student enthusiasm and promoting student testimony, and presenting alumni successes. Offering training to faculty increases the likelihood of GIS being supported as a tool for business analysis. Developing relationships with the business community and GIS industry reinforces the need for geospatial analysis and the concept that GIS is a viable and sought after technology.

Additional resources for learning more about GIS in business and education can be found at

[www.esri.com/banking/](http://www.esri.com/banking/)

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If you have any questions, contact the ESRI higher education solutions team at [highered@esri.com](mailto:highered@esri.com).



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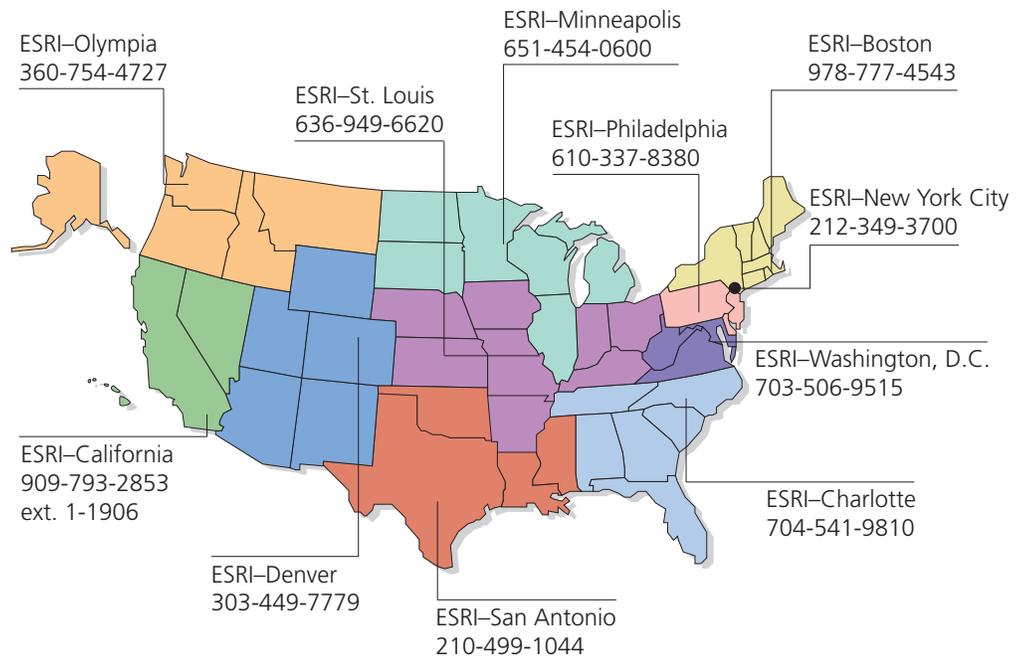
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