The Geospatial Surveying Engineering Master of Science Degree Program is the only known one of its kind in the United States. Therefore, it is difficult to compare the degree program to other similar programs. This report attempts to compare the degree program to other somewhat similar programs. The uniqueness in content and hybrid-online format makes it difficult to make a straight comparison.

This degree began from courses offered in the Master of Science in Computer Science with courses that met and held lecture times. The degree was moved to a hybrid-online method which has students attend lectures in a 40 hour week before the semester, then complete assignments over the remainder of the semester. The work tends to be more rigorous than a lecture driven course, as more work is placed on the student and the faculty.

Faculty must structure course reading assignments, laboratories, and exams in a manner that conveys the concepts and the expected results. Student must spend more time networking with other students and faculty to complete the assignments. Different faculty utilize different technologies to complete the student faculty interaction. Digital Video in the form of Podcast, step-by-step tutorials, animation screen captures, and text to MP3 have been utilized. Faculty have held online conference calls. Additionally, students have open communication channels with the students who are on campus completing the degree to query faculty where concepts, theory or assignments need clarification.

The degree’s content is very rigorous in current geospatial theory and science. The Conrad Blucher Institute for Surveying Science, where the faculty are housed, conducts research for NASA, NOAA, USACE, NGA, NSF, the Texas General Land Office, and other governmental and private industries. This research is incorporated into the degree program. All faculty hold PhD’s, in similar
areas of science focus, and two faculty have Professional Surveying Licenses. The degree is not ABET approved, but the goal is to have the degree evaluated at the 2012 visit of the undergraduate degree. The Academic Advisory Committee which is setup to assess the undergraduate Bachelors degree has been asked to review the curriculum of the Masters degree.

Faculty publish the degree curriculum in national and international publications and discusses the degree rigor and content openly with future employers of students, and alumni of the undergraduate degree. Courses are reviewed using the ABET method of course outcomes and degree objectives. Self-study report, exit interviews, voted faculty minutes, faculty reviews, and course evaluations are used as well as the university assessment tool of WEAVE to assess the degree.

It is the program’s policy to ensure scientific rigor in all aspects of its educational objectives. Faculty members participate in continuing education as part of their professional licensure. Additionally, faculty are required to produce peer-reviewed publications which require in depth research into current issues and publications.

Table 1.0 in this report includes a comparison between descriptions of courses offered in the GSEN degree as compared to other degree programs nationwide. Exhibit 1 compares a syllabus of a course given in the GSEN degree and a similar course offered at another university.
<table>
<thead>
<tr>
<th>FALL 2008</th>
<th>TAMUCC GSEN Courses</th>
<th>USC MS in Geography Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSEN 5110 GSEN PRO-</td>
<td>Introduction to the graduate program and the program faculty, including major foci of research activities and directions within the program. Research, publication, and scientific reporting is described and presented. Description of the outcomes and objectives of the Geospatial Surveying Engineering program. Prerequisite: Permission of the Program Coordinator.</td>
<td></td>
</tr>
<tr>
<td>SEMINAR</td>
<td>Application of multivariate statistical procedures to research problems in GSEN, with emphasis on peculiarities of such applications. Spatial autocorrelation, areal aggregation, modifiable areal unit problem, spatial interpolation, and trend surfaces are investigated with statistical and GIS software packages. Prerequisite: Permission of the Program Coordinator.</td>
<td></td>
</tr>
<tr>
<td>GSEN 5365 GEOSPATIAL MYLITIVARIATE TECHNIQUES</td>
<td>Advanced problems in photo interpretation, photogrammetry and remote sensing within a GIS. Topics include utilization of expert computer systems, knowledge based environmental modeling, macro languages and spatial modeling languages. Operations and laboratories will cover mathematical operations on raster layers, convolution filtering, neighborhood analysis, principal components, proximity, contiguity and descriptor table manipulation. Final project includes the development of a remote sensing of the environment software program with a graphical user interface. Prerequisite: Permission of the Program Coordinator.</td>
<td></td>
</tr>
<tr>
<td>GSEN 5380 PROBLEMS IN REMOTE SENSING OF THE ENVIRONMENT</td>
<td>538 Spatial Analysis and Modeling: Examination of the process of geographic abstraction and modeling in relation to the different data model and spatial analysis operation available in current GIS.</td>
<td></td>
</tr>
</tbody>
</table>
GSEN 5382 POLICY AND LEGAL ASPECTS OF SPATIAL INFORMATION SYSTEMS

A study of the current and emerging status of computer law in electronic environments. Covers issues related to: privacy, freedom of information, confidentiality, copyright, and legal liability; the impact of statute and case law on use of digital databases and spatial databases; and research of legal options of conflicts related to spatial data. Prerequisite: Permission of the Program Coordinator.

GSEN 5384 GENERALIZATION OF TOPOGRAPHIC MAPS

This course will cover principles of advanced cartographic generalization including cartometric evaluation and spatial and attribute transformations. Topics include an overview of vector based and raster based generalization and the mathematical foundations of topographic map design and generalization. Prerequisite: Permission of the Program Coordinator.

GSEN 5396 DIRECTED INDEPENDENT STUDY

Study in areas of current interest. Prerequisite: Permission of the Program Coordinator. (A maximum of six hours may be counted toward the MS degree.)

SPRING 2009

GSEN 5355 DESIGN AND ANALYSIS OF GIS APPLICATIONS

An advanced course that concentrates on the design and analysis of the development of GIS software. Course will utilize “Active X” map objects within JAVA, VB, Delphi or C++. Covers basic operation in GIS software design and software engineering procedures for final product distribution. Development of final product with associated data distributions files for stand alone, imbedded and web enabled applications. Prerequisite:

589 Cartography and Visualization:

Principles of visual perception, spatial cognition and cartographic design and their contributions to the maps, animations, virtual reality and multimedia displays produced with modern GIS.

591 Web GIS: Design, emplementation, and technological building blocks (includign GML) for distributed web-based GIS services.

586 GIS Programming and Customization:

Designing, coding and implementation of GIS - based software and mode3ls with Java,and Visual basic.net programming langues.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSEN 5381</td>
<td>CADASTRAL INFORMATION SYSTEMS</td>
</tr>
<tr>
<td>GSEN 5383</td>
<td>DESIGNING DIGITAL SURFACE MODELS</td>
</tr>
<tr>
<td>GSEN 5385</td>
<td>ANALYTICAL AND DIGITAL PHOTOGRAMMETRIC ENGINEERING</td>
</tr>
<tr>
<td>588</td>
<td>Remote Sensing for GIS:</td>
</tr>
</tbody>
</table>

**Permission of the Program Coordinator.**

**GSEN 5381 CADASTRAL INFORMATION SYSTEMS**

A review of the evolution of European cadastral systems and land records traditions and alternatives. Examination of the goals and purposes of land tenure systems with attention to social, political, legal, economic, organizational, and technical issues. Exploration of U.S. modernization efforts and the problems of developing countries. Prerequisite: Permission of the Program Coordinator.

**GSEN 5383 DESIGNING DIGITAL SURFACE MODELS**

This course will provide an in-depth examination of digital surface models (DSMs) with an emphasis on digital terrain models (DTMs). The theory of DSMs will include data acquisition, type of surface or terrain, point distribution and density, interpolation procedures, data output, and applications of DSMs. Topics covered will include digital elevation models (DEMs), vertical datums, accuracy standards, enabling technologies, quality assessment and user requirements with an introduction to terrain analysis. Prerequisite: Permission of the Program Coordinator.

**GSEN 5385 ANALYTICAL AND DIGITAL PHOTOGRAMMETRIC ENGINEERING**

A study of the mathematical and geometric models of modern photogrammetry. Covers principles of stereoscopic vision, collinearity, coplanarity, epipolar geometry, ground control densification and extension by analytical aerotriangulation. Explores automation in photogrammetric procedures - digital aerotriangulation, automated data capture. Prerequisite: Permission of the Program Coordinator.

**588 Remote Sensing for GIS:**

Principles of remote sensing, satellite systems, and role of remote sensing data in GIS applications.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSEN 5390</td>
<td>ADVANCED TOPICS</td>
<td>Variable content study of specific areas of geospatial surveying engineering. May be repeated for credit when topics vary. Offered on sufficient demand. Prerequisite: Permission of the Program Coordinator.</td>
</tr>
<tr>
<td>SUMMER 2009</td>
<td>GSEN 5395</td>
<td>GRADUATE PROJECT RESEARCH AND PROPOSAL</td>
</tr>
<tr>
<td>Summer 2009 or Independent</td>
<td>GSEN 5393</td>
<td>GRADUATE CREATIVE PROJECT</td>
</tr>
</tbody>
</table>
Committee. May be repeated for credit. Prerequisite: Permission of the Program Coordinator.

GSEN 5396 DIRECTED INDEPENDENT STUDY

Study in areas of current interest. Prerequisite: Permission of the Program Coordinator. (A maximum of six hours may be counted toward the MS degree.)

GSEN 5398 GRADUATE THESIS

An applied research project in geospatial surveying engineering from problem definition to implementation in an area of particular interest to the student that relates to the course of study. Prerequisites: GSEN 5395 and formal approval of graduate thesis proposal. Offered on a satisfactory/unsatisfactory (S/U) basis only, with grade of IP until completed. Credit will not be recorded until thesis is accepted by the Graduate Project Committee. May be repeated for credit. Prerequisite: Permission of the Program Coordinator. (See graduate thesis procedure under “Chronological Procedure Leading to the MS degree.”)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Description</th>
<th>Prerequisite</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSEN 5110</td>
<td>GSEN PRO-SEMINAR</td>
<td>Introduction to the graduate program and the program faculty, including major foci of research activities and directions within the program. Research, publication, and scientific reporting is described and presented. Description of the outcomes and objectives of the Geospatial Surveying Engineering program. Prerequisite: Permission of the Program Coordinator.</td>
<td>Permission of the Program Coordinator.</td>
<td>1</td>
</tr>
<tr>
<td>GSEN 5365</td>
<td>GEOSPATIAL MULTIVARIATE TECHNIQUES</td>
<td>Application of multivariate statistical procedures to research problems in GSEN, with emphasis on peculiarities of such applications. Spatial autocorrelation, areal aggregation, modifiable areal unit problem, spatial interpolation, and trend surfaces are investigated with statistical and GIS software packages. Prerequisite: Permission of the Program Coordinator.</td>
<td>Permission of the Program Coordinator.</td>
<td>3</td>
</tr>
<tr>
<td>SIE 501</td>
<td>Introduction to Graduate Research</td>
<td>Covers process of successful graduate research from identification of a researchable question, preparation of a thesis proposal, to completion or the research and its publication. Focus on engineering research methods for spatial information.</td>
<td>Permission of the Program Coordinator.</td>
<td>1</td>
</tr>
<tr>
<td>SIE 539</td>
<td>Statistics for Spatial Information Engineering</td>
<td>Develops fundamental knowledge of statistical analysis of engineering data, with emphasis on geospatial applications. Covers propagation of random errors and variance-covariance, adjusting geospatial observations through various stochastic models, combining observations and conditions among parameters, proceeding with sequential solutions in the presence of steady information flow, modeling and communicating uncertainty in information systems, devising statistical tests.</td>
<td>Permission of the Program Coordinator.</td>
<td>3</td>
</tr>
</tbody>
</table>
GSEN 5380 PROBLEMS IN REMOTE SENSING OF THE ENVIRONMENT

Advanced problems in photo interpretation, photogrammetry and remote sensing within a GIS. Topics include utilization of expert computer systems, knowledge based environmental modeling, macro languages and spatial modeling languages. Operations and laboratories will cover mathematical operations on raster layers, convolution filtering, neighborhood analysis, principal components, proximity, contiguity and descriptor table manipulation. Final project includes the development of a remote sensing of the environment software program with a graphical user interface. Prerequisite: Permission of the Program Coordinator.

GSEN 5382 POLICY AND LEGAL ASPECTS OF SPATIAL INFORMATION SYSTEMS

A study of the current and emerging status of computer law in electronic environments. Covers issues related to: privacy, freedom of information, confidentiality, copyright, and legal liability; the impact of statute and case law on use of digital databases and spatial databases; and research of legal options of conflicts related to spatial data. Prerequisite: Permission of the Program Coordinator.

GSEN 5384 GENERALIZATION OF TOPOGRAPHIC MAPS

This course will cover principles of advanced cartographic generalization including cartometric evaluation and spatial and attribute transformations. Topics include an overview of vector based and raster based generalization and the mathematical foundations of topographic map design and generalization. Prerequisite: Permission of the Program Coordinator.

GSEN 5396 DIRECTED INDEPENDENT STUDY

Study in areas of current interest. Prerequisite: Permission of the Program Coordinator. (A maximum of six hours may be counted toward the MS degree.)

SIE 536 Remote Sensing

Image formation, B&W and color film, cameras, panchromatic, multispectral and radar imagery, principles of stereoscopic viewing and measurement, orientations, aerotriangulation, matching, orthophotography, accuracy and reliability of image measurements, satellite programs, term project. Lec 2, Lab 1. Credits: 3

SIE 525 Information Systems Law

Current and emerging status of computer law in electronic environments: rights of privacy, freedom of information, confidentiality, work product protection, copyright, security, legal liability; impact of law on use of databases and spatial datasets; legal options for dealing with conflicts and adaptations of law over time. Credits: 3

589 Cartography and Visualization:

Principles of visual perception, spatial cognition and cartographic design and their contributions to the maps, animations, virtual reality and multimedia displays produced with modern GIS.
An advanced course that concentrates on the design and analysis of the development of GIS software. Course will utilize "Active X" map objects within JAVA, VB, Delphi or C++. Covers basic operation in GIS software design and software engineering procedures for final product distribution. Development of final product with associated data distributions files for stand alone, imbedded and web enabled applications. Prerequisite: Permission of the Program Coordinator.

A review of the evolution of European cadastral systems and land records traditions and alternatives. Examination of the goals and purposes of land tenure systems with attention to social, political, legal, economic, organizational, and technical issues. Exploration of U.S. modernization efforts and the problems of developing countries. Prerequisite: Permission of the Program Coordinator.

This course will provide an in-depth examination of digital surface models (DSMs) with an emphasis on digital terrain models (DTMs). The theory of DSMs will include data acquisition, type of surface or terrain, point distribution and density, interpolation procedures, data output, and applications of DSMs. Topics covered will include digital elevation models (DEMs), vertical datums, accuracy standards, enabling technologies, quality assessment and user requirements with an introduction to terrain analysis. Prerequisite: Permission of the Program Coordinator.
GSEN 5385 ANALYTICAL AND DIGITAL PHOTOGRAMMETRIC ENGINEERING

A study of the mathematical and geometric models of modern photogrammetry. Covers principles of stereoscopic vision, collinearity, coplanarity, epipolar geometry, ground control densification and extension by analytical aerotriangulation. Explores automation in photogrammetric procedures - digital aerotriangulation, automated data capture. Prerequisite: Permission of the Program Coordinator.

GSEN 5390 ADVANCED TOPICS

Variable content study of specific areas of geospatial surveying engineering. May be repeated for credit when topics vary. Offered on sufficient demand. Prerequisite: Permission of the Program Coordinator.

SIE 534 Digital Image Processing

Introduction to image processing and analysis techniques suitable to the processing of close-range, aerial or space-borne sensor data. Topics include elements of digital image processing and analysis systems; image digitization, quantization and sampling; geometric operations; image enhancements pint operations and filtering; transformations in spatial and frequency domains; image segmentation and feature extraction; automated information extraction and incorporation in information systems. Lec 2, Lab 1. Credits: 3

SIE 698 Selected Topics

Advanced topics in surveying, photogrammetry, remote sensing, land information systems, and geodesy. May be repeated for credit. Credits: 1-3

SUMMER 2009

GSEN 5395 GRADUATE PROJECT RESEARCH AND PROPOSAL

Preparatory and developmental research for the graduate thesis or creative project resulting in the preliminary design and formal proposal of the graduate project. This thesis or a creative project proposal must be reviewed and approved by the project chairperson to receive credit. Offered on a credit/no-credit basis only. Students are required to complete a major field assessment test. Credit will not be recorded until the Graduate Project Proposal is approved by the Graduate Project Committee Chair. Prerequisite: Permission of the Program Coordinator.
GSEN 5393 GRADUATE CREATIVE PROJECT
An applied research group project in geospatial surveying engineering from problem definition to implementation in an area provided by faculty in the course of study. Prerequisites: GSEN 5395 and formal approval of graduate project proposal. Offered on a satisfactory/unsatisfactory (S/U) basis only, with grade of IP until completed. Credit will not be recorded until technical report is accepted by the Graduate Project Committee. May be repeated for credit. Prerequisite: Permission of the Program Coordinator.

GSEN 5396 DIRECTED INDEPENDENT STUDY
Study in areas of current interest. Prerequisite: Permission of the Program Coordinator. (A maximum of six hours may be counted toward the MS degree.)

GSEN 5398 GRADUATE THESIS
An applied research project in geospatial surveying engineering from problem definition to implementation in an area of particular interest to the student that relates to the course of study. Prerequisites: GSEN 5395 and formal approval of graduate thesis proposal. Offered on a satisfactory/unsatisfactory (S/U) basis only, with grade of IP until completed. Credit will not be recorded until thesis is accepted by the Graduate Project Committee. May be repeated for credit. Prerequisite: Permission of the Program Coordinator. (See graduate thesis procedure under “Chronological Procedure Leading to the MS degree.”)
Exhibit 1: Comparison of syllabi

University of Maine Syllabus

SIE 526 Cadastral and Land Information Systems

Instructor:

Professor Harlan Onsrud, onsrud@spatial.maine.edu, Rm 336 Boardman, 581-2175, fax 581-206

Meetings:

Tues and Thurs at 12:30 to 1:45, 336 Boardman

Description:

Colonial Spanish, English, and French land records traditions and alternatives reviewed. Examines the goals and purposes of land tenure systems with attention to social, political, legal, economic, organizational, and technical issues. Explores U.S. modernization efforts and problems of developing countries. Lec 3.

Goals:

(1) Consider some of the current land problems now facing a wide range of nations
(2) Explore the role of land titling and mapping in addressing those problems
(3) Become familiar with both colonial European and alternative cadastral traditions
(4) Become familiar with the goals and purposes of land tenure systems
(5) Gain an appreciation of political, social, and cost issues
(6) Gain an understanding of the organizational and technical issues that support such systems or improvement of such systems
(7) Look at some very practical guidelines for implementing land titling systems
(8) Consider land records modernization efforts in the U.S. (primarily deed recording system automation and ties to government GIS),

(9) Look at some cadastral project implementations worldwide.

(10) Critique the guidelines for improving land rights systems and develop further strategies.

**Recommended Texts:**

- **Land Information Management: An Introduction with Special Reference to Cadastral Problems in Third World Countries**, Peter Dale and John McLaughlin (Oxford: Clarendon Press, 1988)
- **Land Registration: Managing Information for Land Administration**, PhD Dissertation, S.E. Nichols (University of New Brunswick, 1993)
COURSE NAME: GSEN 5381 (20709): Cadastral Information Systems 3 SCR

LECTURE TIMES: TBA

LECTURE LOCATION: TBA

INSTRUCTORS: Dr. Gary A. Jeffress, RPLS
Office: CBI 109, Phone: 361-825-2720
EMail: gary.jeffress@tamucc.edu

CONSULTATION: 1:30 PM - 4:30 PM Monday and Wednesday or by appointment.

COURSE DESCRIPTION:
The evolution of European cadastral systems and land records traditions and alternatives reviewed; goals and purposes of land tenure systems with attention to social, political, legal, economic, organizational, technical issues examined; U.S. modernization efforts and problems of developing countries explored.

COURSE OBJECTIVES:
1. Understand the principles of land ownership recording systems.
2. Become familiar with the concepts of land administration, conveyancing, and real estate markets.
3. Become familiar with modern cadastral systems.
4. Understand the challenges of implementing cadastral systems in developing countries.

REQUIRED TEXTS:

COURSE REQUIREMENTS:
Course requirements include the following:
1) It is the student’s responsibility to check emails concerning course materials and to seek information from the course web site.
2) Completion and submission of assignments by the due date.
3) Attendance and completion of quizzes on the scheduled date and time.
4) Participation in email discussion.

COURSE OUTLINE:

TOPICS

1 INTRODUCTION: Overview of course objectives and requirements. Definitions. History of cadastral systems.
2 PRINCIPLES OF CADAstral SYSTEMS: Examples of cadastral systems presented by class.
3 IMPORTANCE OF CADAstral SYSTEMS: A look at the economic impact of land and real estate ownership.
4 CADAstral SYSTEMS AND THE LAW: Examine the relationship between the legal system and cadastral systems.
5 DIGITAL ORGANIZATION OF CADAstral SYSTEMS: Show examples of automated cadastral systems.
6 CADAstral SYSTEMS IN DEVELOPING COUNTRIES: Examples of cadastral systems in developing countries and strategies to improve these systems.
7 WORLDWIDE INTEREST IN CADAstral SYSTEMS: A look at current trends in the advancement of cadastral systems throughout the world.

1 Subject to change.
ASSESSMENT:

1) Reports  30%
2) Participation.  20%
2) Mid-semester Quiz.  25%
4) End-semester Quiz.  25%
TOTAL  100%

Grade Computation:

A  ≥90
B  ≥80 and <90
C  ≥70 and <80
D  ≥60 and <70
F  <60

The Geographic Information Science Program complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you need disability accommodations in this class, please see me as soon as possible. Please have your accommodation letter from TAMU-CC Services for Students with Disabilities Office with you when you come see me. If you suspect that you may have a disability (physical impairment, learning disability, psychiatric disability, etc.), please contact the Services for Students with Disabilities Office (located in Driftwood 101) at 825-5816. It is important that you contact them in a timely fashion as it may take several days to review requests and prepare accommodations.
### Exhibit 2: Similar degree online description comparison

<table>
<thead>
<tr>
<th>Texas A&amp;M University- Corpus Christi Geospatial Surveying Engineering</th>
<th>University of Southern California Geographic Information Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Description:</strong></td>
<td></td>
</tr>
<tr>
<td>The Master of Science in Geospatial Surveying Engineering will</td>
<td>USC College has long provided world-class training in Geographic</td>
</tr>
<tr>
<td>provide students with knowledge and skills focusing on the research,</td>
<td>Information Science (GIS) for working professionals through our</td>
</tr>
<tr>
<td>design, development, and use of technologies in geospatial surveying</td>
<td>online graduate Certificate program. Our success is built on our</td>
</tr>
<tr>
<td>engineering. The program builds upon the ABET accredited</td>
<td>vision of combining the core science with real-world applications</td>
</tr>
<tr>
<td>undergraduate Geographic Information Science program (GISC) and</td>
<td>to provide state-of-the-art, tailored GIS training. What students</td>
</tr>
<tr>
<td>the existing geographic information science concentration in the</td>
<td>want from advanced training is to learn practical applications of</td>
</tr>
<tr>
<td>master’s program in computer science. The program satisfies the</td>
<td>GIS that they can apply in their professional and research lives.</td>
</tr>
<tr>
<td>regional, state and national need for master’s-level graduates in</td>
<td>At USC College, our GIS faculty continues to focus on this practical</td>
</tr>
<tr>
<td>geospatial systems design and surveying engineering. Due to the</td>
<td>need; equip students with the knowledge and techniques to develop</td>
</tr>
<tr>
<td>diversity of geospatial applications in industry, the 37 credit</td>
<td>their own GIS applications, rather than merely being schooled in</td>
</tr>
<tr>
<td>hour program is purposely designed to offer breadth in the course</td>
<td>use of software.</td>
</tr>
<tr>
<td>work.</td>
<td></td>
</tr>
<tr>
<td>The degree requires a minimum of 37 semester-credit hours. This</td>
<td>Our online Master of Science Program in Geographic Information</td>
</tr>
<tr>
<td>must include 25 semester credit hours in the geospatial surveying</td>
<td>Science and Technology (GIST) takes our professional education</td>
</tr>
<tr>
<td>engineering core, a 3 semester credit hour graduate proposal and 9</td>
<td>mission to the next step. It provides students with the substantial</td>
</tr>
<tr>
<td>semester credit hours of either graduate thesis (resulting in a</td>
<td>graduate training currently required by government and industry.</td>
</tr>
<tr>
<td>completed thesis) or graduate creative project (resulting in a</td>
<td>Today, the numbers of skilled GIS professionals remain limited and</td>
</tr>
<tr>
<td>formal technical report).</td>
<td>more advanced training is required to match the demand from the</td>
</tr>
<tr>
<td><strong>Objectives of the program:</strong></td>
<td>public and private sector. Our Masters program meets the needs of</td>
</tr>
<tr>
<td>Graduates of the Master of Science in Geospatial Surveying</td>
<td>today’s researchers and professionals. It will equip you with the</td>
</tr>
<tr>
<td>Engineering will demonstrate the ability to:</td>
<td>necessary skills to cope with increasing data complexity and more</td>
</tr>
<tr>
<td>1. Develop, manage, and analyze geospatial data using field and</td>
<td>sophisticated applications.</td>
</tr>
<tr>
<td>laboratory techniques, integrating surveying and engineering.</td>
<td>The GIST Master of Science requires completion of six graduate</td>
</tr>
<tr>
<td>2. Develop the capacity for continued learning and professional</td>
<td>courses plus a Master’s Thesis (28 units). Required core courses</td>
</tr>
<tr>
<td>application.</td>
<td>begin with Concepts for Spatial Thinking (GEOG 581) followed by</td>
</tr>
<tr>
<td>3. Apply geospatial surveying engineering technologies creatively</td>
<td>Database Theory (GEOG 582) and GPS/GIS Field Techniques (GEOG 587)</td>
</tr>
<tr>
<td>in real-world setting to solve geospatial processes and effects.</td>
<td>plus three GIST electives appropriate to the student’s application</td>
</tr>
<tr>
<td></td>
<td>interests. These online courses are available to students worldwide.</td>
</tr>
<tr>
<td></td>
<td>The GIST Master’s Program can be completed within 2-3 years by</td>
</tr>
</tbody>
</table>
4. Become nationally and internationally recognized professionals.

**Program Outcomes:**

Graduates of the Master of Science in Geospatial Surveying Engineering will have:

1. The ability to lead teams and apply problem-solving skills that include oral and written communication skills to effectively communicate professional geospatial information.
2. An awareness and utilization of external organizations and institutions that provide useful geospatial data sets and their relationships to traditional and contemporary societal issues.
3. A recognition of the need for continued learning and development of leadership skills through involvement in volunteer professional organizations and societies.

**Degree Requirements**

The course of study leading to an MS degree in Geospatial Surveying Engineering is composed of four components:

1. General prerequisites (must be satisfied before the student can be formally and unconditionally accepted to the MS program).
2. Required Core Courses.
4. Graduate Thesis or Graduate Creative Project.

fall, spring and summer semesters