

MAJOR IN GEOGRAPHIC INFORMATION SCIENCE

Requirements

Code	Title	Units
GEOG 101	PHYSICAL GEOGRAPHY	3
GEOG 221	INTRODUCTION TO GEOSPATIAL TECHNOLOGY	3
GEOG 321	INTRODUCTION TO REMOTE SENSING AND PHOTOGRAMMETRY	3
GEOG 322	INTRO TO GEOGRAPHIC INFORMATION SCIENCE	4
GEOG 323	CARTOGRAPHY AND GRAPHICS I	3
GEOG 414 or GEOG 465	GIS APPLICATIONS ADVANCED TECHNIQUES IN GIS	3
GEOG 416	ADVANCED REMOTE SENSING: DIGITAL IMAGE PROCESSING AND ANALYSIS	3
COSC 236	INTRODUCTION TO COMPUTER SCIENCE I	4
CIS 211	FUNDAMENTALS OF INFORMATION SYSTEMS & TECHNOLOGY	3
CIS 328	INTRODUCTION TO DATA ANALYTICS	3
MATH 231	BASIC STATISTICS	3
MATH 211 or MATH 273	CALCULUS FOR APPLICATIONS CALCULUS I	3
Electives		
Select three from the following:		9
GEOG 315	GEOMORPHOLOGY	
GEOG 319	SOILS AND VEGETATION	
GEOG 375	QUANTITATIVE METHODS IN GEOGRAPHY	
GEOG 376	QUALITATIVE METHODS IN GEOGRAPHY	
GEOG 377	METEOROLOGY	
GEOG 383	NATURAL RESOURCES AND SOCIETY: A GEOGRAPHIC PERSPECTIVE	
GEOG 408	APPLICATION OF GIS IN EMERGENCY MANAGEMENT	
GEOG 426	GIS DATABASE DESIGN	
GEOG 428	PYTHON SCRIPTING FOR ARCGIS	
GEOG 471	GEOSPATIAL TECHNOLOGIES SPECIAL TOPICS	
GEOG 496	INDEPENDENT STUDY IN GEOGRAPHY ^{GIS} topic approved by program director	
Selective two from the following:		6
ITEC 217	COMPUTING HARDWARE AND INFRASTRUCTURE	
ITEC 231	FUNDAMENTALS OF WEB TECHNOLOGIES	
ITEC 270	SELECTED TOPICS IN INFORMATION TECHNOLOGY	
ITEC 315	DATA AND INFORMATION MANAGEMENT	
ITEC 345	SCRIPTING LANGUAGES	
ITEC 451	ADVANCED DATA MANAGEMENT & ANALYSIS	
CIS 334	DATA ORGANIZATION	

CIS 458	ORGANIZATIONAL DATABASE MANAGEMENT	
CIS 468	APPLIED DATA SCIENCE & MACHINE LEARNING	
COSC 237	INTRODUCTION TO COMPUTER SCIENCE II	
COSC 336	DATA STRUCTURES AND ALGORITHM ANALYSIS	
COSC 418	ETHICAL AND SOCIETAL CONCERNS OF COMPUTER SCIENTISTS	
MATH 263	DISCRETE MATHEMATICS	
MATH 265	ELEMENTARY LINEAR ALGEBRA	
MATH 274	CALCULUS II	
MATH 330	INTRODUCTION TO STATISTICAL METHODS	
MATH 331	PROBABILITY	
MATH 332	MATHEMATICAL STATISTICS	
MATH 337	APPLIED REGRESSION AND TIME SERIES PREDICTIVE MODELING	
MATH 371	INTRODUCTION TO MACHINE LEARNING	
MATH 377	MATHEMATICAL MODELS	
MATH 378	EXPERIMENTAL MATHEMATICS	
Total Units		53

Four-Year Plan of Study

Sample Four-Year Plan

The selected course sequence below is an example of the simplest path to degree completion. Based on course schedules, student needs, and student choice, individual plans may vary. Students should consult with their adviser to make the most appropriate elective choices and to ensure that they have completed the required number of units (120) to graduate.

First Year

Term 1	Units	Term 2	Units
GEOG 101 (Core 8)	3	GEOG 221	3
Core 1 (or Core 2)	3	MATH 231 (Core 3)	3
Core 4	3	Core 2 (or Core 1)	3
Elective (COSC 111 recommended)	3	Core 6	3
Elective	3	Core 7	4
15		16	

Second Year

Term 1	Units	Term 2	Units
GEOG 322	4	GEOG 321	3
MATH 273	4	COSC 236	4
Elective	3	GEOG Elective (1)	3
Core 5	3	Core 11	3
Core 10	3	Core 13	3
17		16	

Third Year

Term 1	Units	Term 2	Units
CIS 211	3	CIS 328	3
GEOG Elective (2)	3	COSC / CIS Elective (1)	3
MATH Elective (1)	3	COSC / CIS Elective	3
Core 12	3	GEOG 323	3

Core 14	3 Core 9	3
	15	15
Fourth Year		
Term 1	Units Term 2	Units
GEOG 414 or 465	3 GEOG Elective (3)	3
GEOG 416	3 Elective	3
Elective	3 Elective	3
Elective	3 Internship or Elective	3
Elective	2	
	14	12
Total Units 120		

Learning Outcomes

The overarching educational objective of the program is to create technically competent GIS technicians possessing the skills necessary for advanced GIS analysis and for supporting applications of GIS in a wide variety of private and public sector settings. The program learning outcomes (PLOs) are as follows (with the alignment to TU's institutional student learning outcomes [ISLOs] indicated):

1. **Spatial Data Analysis** (*Critical Analysis and Reasoning*): Students will be able to perform comprehensive analyses of geospatial data using professional geospatial software, spatial analysis techniques, and statistical methods.
2. **Data Mining and Management** (*Information Literacy and Technological Competency*): Students will apply information systems and data science techniques, such as programming, data mining, big data processing, database management, algorithm development, workflow automation, and web development, to effectively manage, analyze, and visualize geospatial data and to address complex geospatial challenges in diverse industries.
3. **Data Visualization** (*Effective Communication*): Students will be able to visualize and communicate geospatial data and results using various formats, such as maps, web mapping applications, story maps, charts, and professional presentations.
4. **Problem-Solving Skills** (*Working in Multifaceted Work Environments*): Students will be able to integrate geospatial data with other types of data to address socio-economic, environmental, planning, and other real-world challenges, supporting decision-making processes.