Geospatial Science (GSS)

Minor in Geospatial Science
Sustainability Studies

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Geospatial Science
Geospatial analysis is used in a wide range of disciplines as a research tool, a decision-making tool, data analysis tool, and/or as a planning tool. The Minor in Geospatial Analysis is a flexible undergraduate minor that allows students drawn from a broad spectrum of backgrounds to acquire the necessary training in geospatial analysis to complement their area of study. Students will receive training in the use of Geographical Information Systems and may choose from several electives to broaden their experience in geospatial analysis.

Requirements for the minor in Geospatial Science
At least 12 credits applied to the minor may not be applied to any major or other minor within the Sustainability Studies Program or the School of Marine and Atmospheric Sciences. No more than one three-credit course in the minor may be taken under the Pass/No Credit option. All upper-division courses offered for the minor must be passed with a letter grade of C or higher. Completion of the minor requires 21-22 credits.

Required courses (12-13 credits):

• GSS 105 Introduction to Maps and Mapping
• GSS 313 GIS Design and Applications I or GSS 317 Geospatial Narratives
• GSS 314 GIS Laboratory (for students enrolling in GSS 313)
• GSS 325 GIS Design and Applications II
• GSS 355 Remote Sensing GIS Data or MAR 334 Remote Sensing in the Environment or GEO 347 Remote Sensing

Elective courses (select 9 credits from the following):

• GSS 309 GIS and Cartography
• GSS 323 GIS Database and Design
• GSS 326 GIS Project Management
• GSS 350 Applied Spatial Data Analysis
• GSS 354 Geospatial Science for the Coastal Zone
• GSS 390 Topic in Geospatial Science
• GSS 475 Undergraduate Teaching Practicum
• GSS 487 Geospatial Science Research (see Note)
• GSS 488 Geospatial Science Internship (see Note)
• ATM 320 Spatial Data Analysis Using Matlab
• ANT 420/GEO 420 Environmental Analysis Using Remote Sensing and Geographic Information Systems
• BIO 319 Landscape Ecology Laboratory

Note: A maximum of three credits of GSS 487 Geospatial Science Research and/or GSS 488 Geospatial Science Internship may be applied to the minor.

GSS Faculty
Faculty information for this program can be found at http://www.stonybrook.edu/commcms/gss/people.html
GSS 105: Introduction to Maps and Mapping
An introduction to the study and design of map formats, symbology, coordinate systems, and how maps record the historical patterns of human behavior. The course will also examine maps as a tool to analyze human activity and societal development, and include important aspects of map data collection, processing, the Global Positioning System (GPS), quantitative mapping, and GIS-based mapmaking techniques.

DEC: F
SBC: SBS
3 credits

GSS 309: GIS and Cartography
Cartography is the knowledge associated with the art, science, and technology of maps. Digital computer cartography still follows the same fundamental principles and still requires a broad understanding of graphicacy as a language (as well as numeracy and literacy). This course will provide an introduction to cartographic principles, concepts, software and hardware necessary to produce good maps, especially in the context (and limitations) of geographic information systems (GIS).
Prerequisite: GEO 102 or GSS 105 or MAR 104 or SBC 113 or instructor consent
3 credits

GSS 313: GIS Design and Application I
Provides the basic concepts underlying modern geographic information science and technology. Emphasis is placed on the principles of GIS for characterizing environmental systems and computer-based techniques for processing and analyzing spatial data. The course is three credit hours of lecture. This lecture course must be taken in the same semester as the associated laboratory, GSS 314. Not for credit in addition to GSS 317.
Prerequisite: MAT 125 or MAT 131 or AMS 151 or instructor consent
Corequisite: GSS 314
SBC: TECH
3 credits

GSS 314: GIS Laboratory
Practice using the GIS techniques and tools learned in the lecture (GSS 313), work on exercises, and process and analyze the spatial data for the course project. This laboratory course must be taken in the same semester as GSS 313.
Corequisite: GSS 313
1 credit

GSS 317: Geospatial Narratives: Deep Mapping for Humanities and Social Sciences
Building on formal methods in qualitative reasoning, spatial and temporal representation and geospatial science, this course will explore state-of-the-art methods for humanities and social sciences students to visualize and drill down data. Hands-on exercises of deep mapping will cover how to collect, analyze and visualize quantitative and qualitative data, spatial data, images, video, audio, and other representations of places and artifacts in humanities and social sciences. This course will also discuss models of reasoning about events, actions and changes that are spatially contextualized. Not for credit in addition to GSS 313.
Prerequisite: WRT 102
Advisory Prerequisite: some working knowledge of spreadsheets
SBC: TECH
3 credits

GSS 323: GIS Database and Design
Concepts of geodatabase design and management in geographic information systems (GIS), SQL statements, geographic data types and functions, data entry, techniques of geographic information structure applications. This is a Windows based computer class with the majority of students work involving GIS computer software.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 325: GIS Design & Applications II
The course builds upon the topics covered in GIS Design and Application I. It emphasizes the applications of GIS in solving real-world problems. Students are expected to gain an understanding of GIS theory, methodology and most importantly application. Students are also expected to demonstrate abilities of spatial thinking, spatial analysis, and be able to solve practical spatial problems utilizing a GIS. Because GIS is both a tool for analysis and the visual communication of these data, students will be required to develop a GIS presentation, much as would be expected in a professional setting. This independent project will constitute a substantial portion of the final grade. This is a Windows based computer class with the majority of students work involving GIS computer software.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 326: GIS Project Management
The course addresses issues unique to a GIS operation such as implementation issues, decision making procedures, strategies for success, legal issues, involvement of management, marking within an organization, strategic planning, and industry outlook.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 350: Applied Spatial Data Analysis
An introduction to geospatial statistical analysis that aims to provide students with the background necessary to investigate geographically represented data. The specific focus is on spatial data analysis, such as the analysis of autocorrelation, principles of geostatistics and analysis methods that are relevant in the fields of public health, environmental/earth science and social science. An important aspect of the course is to gain hands-on experience in applying these techniques with GIS and spatial analytical software, and essential methodological and practical issues that are involved in sophisticated spatial analyses.
Prerequisite: AMS 102 or equivalent and GSS 313 or GSS 317 or equivalent
SBC: STEM+
3 credits

GSS 354: Geospatial Science for the Coastal Zone
The use of spatial data is becoming increasingly critical in the decision management process and planning of the coastal zone. This course will use GIS and Remote sensing tools to collect and analyze data for integrating into the management, planning, and monitoring of the coastal geomorphology and ecosystems.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 355: Remote Sensing GIS Data
Provides a basic overview of the technology by which aircraft and satellite images of the Earth are produced as well as hands on experience manipulating and interpreting. Students gain practical experience in environmental analysis using satellite imagery and commonly used sensors and analytical methods for the Earth sciences.
Prerequisite: GSS 105 or MAR 104 or GEO 102

3 credits

GSS 390: Topics in Geospatial Science
Course will present special interest topics or recent software enhancements in the rapidly developing field of Geospatial Science. The course will include a mixture of core geospatial techniques and recently released methodology. Course content will include a diversity of Geospatial topics and include discipline specific topics relevant to majors in physical sciences, social sciences, business and engineering. Repeatable as the topic changes to a maximum of 6 credits.

Prerequisite: U3 or U4 status or permission of the instructor

3 credits

GSS 475: Undergraduate Teaching Practicum
Work with a faculty member as assistant in a regularly scheduled course. The student must attend all classes and carry out all assignments; in addition the student will be assigned a specific role to assist in teaching the course. The student will meet with the instructor on a regular basis to discuss intellectual and pedagogical matters relating to the course.

Prerequisites: Permission of instructor and undergraduate director

SBC: EXP+

3 credits, S/U grading

GSS 487: Geospatial Science Research
Qualified advanced undergraduates may carry out individual research projects under the direct supervision of a faculty member. Repeatable to a maximum of 3 credits.

Prerequisite: Permission of instructor

0-3 credits, S/U grading

GSS 488: Geospatial Science Internship
The GSS Internship is designed to provide students experience in the real workplace. Interns are expected to function as a GIS/Remote Sensing professional and work within the existing host facility structure or on a free standing project. Interns will complete assigned tasks by hosting facility such as GIS data entry, data retrieval, remote sensing analysis, GPS field work, documentation, or general GIS facility duties. These activities will be monitored by both a representative of the host facility and the instructor. May be repeated to a limit of 12 credits.

Prerequisites: GSS 325; GSS 313 or GSS 317, or instructor consent