

Prepared by the Department of Natural Sciences and Applied Technology

Date of Departmental Approval: February 15, 2017

Date Approved by Curriculum and Programs: March 1, 2017

Effective: Fall 2017

1. **Course Number:** ENV163  
**Course Title:** Geographic Information Systems (GIS) I
2. **Description:** GIS I is a two-part course that focuses on the designing and building of a map using a relational database. The course will focus on the principles of data base management as related to cartography and GIS. The students will be provided with the fundamental topics for each subject in class.
3. **Student Learning Outcomes:**  
Upon successful completion of this course, students are able to do the following:
  - Identify the functions of a GIS and the types of questions we are able to ask within a GIS
  - Compare and contrast the two major GIS data models
  - Create a geodatabase, shapefile, and coverage and export data out of a GIS into these different formats
  - Explain the major projection types and choose a particular projection based on the spatial components the Student wants to preserve
  - Perform vector spatial analysis operations in a GIS
  - Perform raster spatial analysis operations in a GIS
  - Create a watershed map using: fill, flow direction, flow accumulation, stream network, stream links, and area-wide watershed
  - Create a simple suitability model
4. **Credits:** 3 credits
5. **Satisfies General Education Requirement:** No
6. **Prerequisite:** MAT020 (Prealgebra) or MAT025 (Pre-Algebra) and ENL108 (Critical Reading & Thinking) or satisfactory basic skills assessment scores
7. **Semester(s) Offered:** Fall, Spring
8. **Suggested General Guidelines for Evaluation:** Hour Exams, Project, Final Exam
9. **General Topical Outline (Optional):**
  - I. Individual Project
    - A. Work with a local organization on a GIS project of the students' choosing
  - II. Review GIS Basics
  - III. GIS Data Models
  - IV. GIS Data types (ESRI proprietary)
    - A. Create a geodatabase, shapefile, and coverage
    - B. Export data out of a GIS into these different formats
  - V. Projections and Datums
    - A. Choose a particular projection based on the spatial components the Student wants to preserve
  - VI. Spatial Analysis (Vector)
    - A. Clip
    - B. Union
    - C. Merge
    - D. Intersect
    - E. Dissolve
    - F. Create buffers using the Buffer Wizard
    - G. Select by location
    - H. Select by attribute

VII. Spatial Analysis (Raster)

- A. Convert Vector data to Raster Cell size and resolution
- B. Map Algebra
- C. Local, neighborhood, and global operations

VIII. Terrain Mapping

- A. Cost surface
- B. Friction surface
- C. Slope and aspect

IX. Viewsheds & Watersheds

- A. Fill, flow direction, flow accumulation, stream network, stream links, and area-wide watershed

X. Suitability Modeling

- A. Simple coincidence, weighted coincidence, and advance weighted coincidence model
- B. Create a simple suitability model