Course Title: **GIS for Agricultural and Natural Resources Management**

Course Abbreviation: AGET 782

Course Credits: 3 hours

Instructor: Timothy N. Burcham, P.E., and Ph.D.

Course Description: **AGET 782 (3)** Principles and application of Geographic Information Systems (GIS) technologies with emphasis on the use of GIS for collecting, storing and analyzing spatial data associated with agricultural and natural resource-based enterprises. GIS software techniques are developed using an interactive/inductive learning process. Students will collect and analyze data to complete a research project using GIS to answer questions related to an agricultural or natural resources topic.


Grading

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Quizzes</td>
<td>35%</td>
</tr>
<tr>
<td>Lit Review Reports</td>
<td>15%</td>
</tr>
<tr>
<td>GPS/GIS Term Project</td>
<td>20%</td>
</tr>
<tr>
<td>Mid-Term Exam</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>15%</td>
</tr>
</tbody>
</table>

Grades

- 90-100: A
- 80-89: B
- 70-79: C
- 65-69: D
- <65: F

Punctuality: Each lecture module and associated assignments will have a definite completion date (as assigned by the instructor). Assignments, formal reports, quizzes, etc. turned in after the posted due date will receive a letter grade deduction per day late.

Term Project: A graduate level term project associated with the application of GIS principles to agricultural and natural resources based problems is required.
Topic Outline

Introduction

What is GIS?
  Concepts
    What is GIS?
    A history of GIS
    What can a GIS do?
    GIS project management
    Project case study: A thorny issue
    Types of GIS projects
    Planning a GIS project

Example of a GIS proposal

Chapter 1. Introducing ArcGIS

Mastering the Concepts
  Concepts
    ArcGIS overview
    Intro to raster and vector data models
    Data files in ArcGIS
    Properties of spatial data files
    Introduction to metadata
    Overview of the ArcGIS Interface
    Object properties
    About ArcCatalog
    About ArcToolbox
  Summary

Chapter 2. Working with ArcMap

Mastering the Concepts
  Concepts
    Map documents
    ArcMap windows and menus
    The Help System
    Data Frames
    Data layer properties
    Working with symbols and styles
    Map scale concepts
    Labeling concepts
  Summary
Chapter 3. Coordinate Systems and Map Projections

Mastering the Concepts
Concepts
  About map projections and GIS
  Geographic coordinate systems
  Spheroids and datums
  Map projections
  A note on terminology
  Common projection systems
  Map projections in ArcMap
  Managing coordinate systems
  Projecting data
  Using ArcToolbox
Summary

Chapter 4. Drawing and Symbolizing Features

Mastering the Concepts
Concepts
  Types of maps
  Classifying numeric data
  Using map layer files
  Editing symbols and using styles
  Displaying rasters
Summary

Chapter 5. Working with Tables

Mastering the Concepts
Concepts
  Overview of tables in ArcGIS
  Table formats
  Field types
  Queries on tables
  Joining and relating tables
  Getting statistics on tables
  Summarizing tables
  Editing and calculating fields
Summary
Chapter 6. Queries

Mastering the Concepts
Concepts
- What are queries?
- Interactive selection
- Selecting by attributes
- Selecting by location
- Choosing the selection method
- Selection states
- Definition queries
- Using queries in GIS Analysis

Summary

Chapter 7. Spatial Joins

Mastering the Concepts
Concepts
- What is a spatial join?
- Types of spatial joins
- Setting up a spatial join

Summary

Chapter 8. Map Overlay

Mastering the Concepts
Concepts
- Map overlay
- Examples of using map overlay
- Other spatial analysis functions
- Coordinate systems and map units

Summary

Chapter 9. Presenting Data

Mastering the Concepts
Concepts
- Tips for making maps
- Maps and reports in ArcGIS
- Working with map elements
- The Layout Toolbar
- Working with map scales
- Setting up scale bars

Summary
Chapter 10. Geocoding

Mastering the Concepts
Concepts
What is geocoding?
How does geocoding work?
Available geocoding styles
The geocoding process
Setting up an address locator
The reference data
Adding x-y coordinates
Summary

Chapter 11. Basic Editing in ArcMap

Mastering the Concepts
Concepts
Editing overview
The Editor Toolbar
General information about editing
Snapping features
Creating adjacent polygons
Editing features
Editing attributes
Saving work
Summary

Chapter 12. More Editing Techniques

Mastering the Concepts
Concepts
Using different sketch tools
Changing existing features
Combining features
Buffering features
Topology and shared features
Summary
Chapter 13. Working with Geodatabases

Mastering the Concepts
Concepts
   About geodatabases
   Creating geodatabases
   Creating features datasets
   Using default values
   Setting up domains
   Split and merge policies
   About subtypes

Summary

Chapter 14. Analyzing Networks

Mastering the Concepts
Concepts
   About networks
   Types of networks
   Network analysis
   The Utility Network Analyst toolbar
   Generic trace solvers
   Utility trace solvers
   Building networks

Summary

Chapter 15. Raster Analysis

Mastering the Concepts
Concepts
   Raster versus vector models
   About rasters
   Coordinate systems and rasters
   Raster analysis
   Boolean map overlay
   Controlling analysis options
   Spatial Analyst and ArcToolbox

Summary