HIGHLAND COMMUNITY COLLEGE

Syllabus
AB 118 Agricultural GIS
3 Credit Hours (Lab)
Prerequisites: None
Revision Date: 03/12/2021

Department:

Precision Agriculture

Course Description:

This course focuses on the concepts and procedures used in discovering and applying the spatial relationships within and among maps. It utilizes the mapping and geo-query capabilities of the agricultural Geographic Information System (GIS) platforms to map, analyze, and construct spatial models. This course establishes a comprehensive framework that encompasses a wide range of multi-layered queries, such as: multi-year yield analysis, yield versus field attribute, or fertility versus observed field attribute. The gathering of these layers enables the end-user to design comprehensive models for the analysis of farming operations leading to the development and implementation of improved strategies on the farm or in industry.

Course Competencies:

Upon completion of the course, the student should be able to:

1. Understand and communicate the differences between a desktop GIS and a web-based GIS and how each is used in agriculture.
2. Form a working knowledge of the proper data collection techniques and the ability to determine the proper method to follow based on the situation and resources available.
3. Form a working knowledge of basic spatial interpolation and statistics procedures.
4. Become knowledgeable in the procedure of importing and manipulating data in a GIS platform.
5. Develop the ability to construct layered maps and export prescriptions to be used in VRT application for commercial and private usage.
6. Develop the ability to gather high-quality field observations and data to create useful information easily communicated with growers.
7. Form a working knowledge of the commercial application of GIS technology and how it is used to drive the sales of agricultural crop inputs.
8. Become able to create precise boundaries and make necessary adjustments to equipment to ensure that prescriptions can be efficiently designed and transferred to machinery.
9. Effectively communicate the knowledge gained by GIS research to growers for efficient decision making.

Course Content:

A. What technologies make up Precision Agriculture?
    1. History of GIS technology in agriculture
    2. Define GIS and how it relates to mapping
    3. Desktop vs. Web-Based GIS applications
B. Basic foundation of GIS platforms
    1. Points (EC, Yield, etc.)
    2. Lines (Drainage, Roads, etc.)
    3. Polygons (Boundaries, Management Zones, etc.)
    4. MegaSurface (how the model relates to real-world data)

5. Imagery (Maps, Digitizing of data layers, etc.)

C. Data Collection Techniques
    1. Creating Field Boundaries (using existing imagery)
    2. Creating Field level data layers (using data collected from the field)
    3. Common Data Collection Errors (Overlapping zones, GPS correction, etc.)
    4. Management Zones

D. Working with Data (Maps and Tables)
    1. Mapping Data Layers (How to create and edit maps)
    2. Tabular Data (How to work with the raw data source)
    3. Data Cleaning
    4. Organizing Data

E. Importing Data
    1. Yield Data (how to clean, import, and generate layers for analysis)
    2. Soil and EC Data (how to define proper management zones)
    3. In-Season observations and experiments (how to spatially define research plots)
    4. Incomplete Data (manipulating datasets to import when not all information is available)

F. Creating Prescriptions for VRT Application
    1. Flat Rate Maps
    2. Zone Rate Maps
    3. Equation Writing and Surface Development

G. Multi-User GIS Platforms
    1. How to share data with multiple users
    2. Challenges and risks of enabling multiple users to access shared data
    3. Efficiencies created by allowing data to be shared
    4. Mobile versus Desktop GIS platform
    5. Sharing data between offices or equipment
    6. Telematics and telecommunications network connectivity in the field

H. Methods of Data Exchange
    1. Challenges of joining data from multiple brands of equipment
    2. Standardization of data
    3. Synching of data between users and profiles
    4. Processing data into information
    5. Creating recommendation export files

I. Mobile Data Collection Systems
    1. Basic function of the mobile apps
    2. Creating Growers, Farms, Fields
    3. Creating soil test point layers
    4. Connecting GPS receivers to mobile devices
    5. Importing soil test lab results
    6. Driving boundaries using GPS
    7. Using mobile devices to collect records
    8. Collecting data, creating information layers, and exporting from the field

J. Commercial Applications of GIS
    1. Transferring data between users and equipment
    2. Using telematics to track movement in real-time
    3. In-field usage of GIS technology as a user-friendly tool
    4. Communication of analysis to customers
    5. Sales tactics using GIS

Learning Assessments:

Competencies may be evaluated by multiple measures, including discussion questions, graded assignments, exams, papers, article reviews, research, and projects.

Instructional Materials:

Textbook**:** GIS Software operator's manuals will be used as reference material. Instructors will provide links to appropriate documents.

Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the "Disabilities Self-Identification Form" on our Disability Services website.

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

A Note on Harassment, Discrimination and Sexual Misconduct

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an online report about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our Equity Grievance Policy.