

# A Geospatial Industry Series for Agriculture

## **Unit 1: Introduction to Geospatial Technology**

- I. What is geospatial technology?
- II. What is Geographic Information Systems (GIS) technology?
- III. What is remote sensing and photogrammetry?
- IV. Where does Global Positioning Systems (GPS) technology fit?
- V. How is geospatial technology used?
- VI. Industry-specific introduction

## **Unit 2: GIS in Power, Structural & Technical Systems**

- I. What are Power, Structural & Technical Systems as they pertain to Agriculture?
- II. How is geospatial technology applied in Power, Structural & Technical Systems for Agriculture? (including Optional Unit Presentation)
  - Power Systems
    - Machine operation – GIS/GPS-controlled farm machinery
    - Agricultural engineering
  - Structural Systems
    - Waste water treatment plant operations
  - Technical Systems
    - Database inventory
- III. Application Experiments (per industry advisory group & E. Worker)

## **Unit 3: GIS in Plant Systems**

- I. What are Plant Systems as they pertain to Agriculture?
- II. How is geospatial technology applied in Plant Systems for Agriculture? (including optional Unit Presentation)
  - Agronomic Systems
    - Precision agriculture
    - Biogeography of invasive species
    - Spatial relationships of historical crop data
    - Pest detection
    - Analyzing climate trends for future production
  - Horticulture Systems
    - Greenhouse management
    - Landscape architecture
    - Environmental horticulture
  - Forestry
    - Harvesting/replanting
    - Forest inventories
    - Fire management
  - Turf
    - Turf health studies via high-resolution imagery (particularly sports fields)
    - Turf health sensors with GPS
  - Viticulture
    - Precision viticulture
    - Harvest planning
    - Yield maps
  - Soils Management
    - Soil suitability
    - Modeling of soil "attributes" such as alkalinity, nutrient content, etc.
    - Modeling of soil conditions of vegetation
- III. Application Experiments (per industry advisory group & E. Worker)

#### **Unit 4: GIS in Animal Systems**

- I. What are Animal Systems as they pertain to Agriculture?
- II. How is geospatial technology applied in Animal Systems for Agriculture?  
(including Optional Unit Presentation)

##### Large Animal Systems

- Identity preserve
- Disease distribution
- New facility placement

##### Small Animal Systems

- Watershed restrictions for facilities
- Companion animal emergency evacuation

##### Wildlife Animals

- Animal movement
- Disease distribution

##### Research Animals

- Disease distribution
- Animal databases

- III. Application Experiments (per industry advisory group & E. Worker)

#### **Unit 5: GIS in Agribusiness Systems**

- I. What are Agribusiness Systems as they pertain to Agriculture?
- II. How is geospatial technology applied in Agribusiness Systems for Agriculture?  
(including Optional Unit Presentation)

##### Agricultural Sales

- Estimating harvest
- Identifying customers

##### Agricultural Services

- Agricultural consulting
- Agricultural "inputs" management

##### Ranch & Farm Management

- Decision support
- Asset management

##### Entrepreneurship

- Sustaining agricultural communities
- Labor studies
- Agricultural heritage areas (AHAs)
- Risk assessment

##### Economics

- Asset management
- Claim estimations

- III. Application Experiments (per industry advisory group & E. Worker)

#### **Unit 6: GIS in Food Products and Processing Systems**

- I. What are Food Products and Processing Systems as they pertain to Agriculture?
- II. How is geospatial technology applied in Food Products and Processing Systems for Agriculture? (including Optional Unit Presentation)

##### Food processing and preserving

- Identity preserve
- Supply/demand issues
- Risk analysis pertaining to natural variations in yield
- Real-time commodity "movement"
- USDA inspection issues

#### Packaging

- Identity preserve
- Food safety issues

#### Distribution

- Routing scenarios in food product distribution
- Risk assessment of agri-terrorism
- Food safety issues
- USDA inspection issues

#### Government monitoring & regulation

- Locating new processing plants
- Identity preserve
- National Animal Identification Service (NAIS)

### III. Application Experiments (per industry advisory group & E. Worker)

## **Unit 7: GIS in Natural Resource Systems**

I. What are Natural Resource Systems as they pertain to Agriculture?

II. How is geospatial technology applied in Natural Resource Systems for Agriculture?  
(including Optional Unit Presentation)

#### Habitat conservation

- Ecological niche modeling (ENM)
- Wetland conservation
- Levy control issues
- Hunting quotas

#### Forest products

- Replanting schedules
- Estimating harvest yields
- Wildfire management

#### Parks and recreation

- Turf health
- Urban recreation development

#### Mining

- Model field data
- Mineral targeting
- Pipeline modeling
- Environmental impact modeling

#### Environmental services

- Environmental modeling
- Ecological impact of landscape changes
- Floodplain issues
- Watershed issues

#### Fisheries

- Mapping historic and projected fishing
- Determine spatial trends in fish distribution
- Habitat identification
- Digital water atlases

#### Soil conservation

- Erosion studies
- Modeling drainage systems

### III. Application Experiments (per industry advisory group & E. Worker)

## **Unit 8: GIS in Environmental Service Systems**

- I. What are Environmental Systems as they pertain to Agriculture?
- II. How is geospatial technology applied in Environmental Systems for Agriculture?  
(including Optional Unit Presentation)

### Pollution prevention

- Pesticide runoff
- Remediation modeling

### Water & air quality

- Monitoring models
- Air quality modeling
- Ground water monitoring models
- Upland watershed management
- Water demand databases

### Hazardous materials

- Spill/plume modeling
- Soil type/groundwater depth models

### Solid waste management

- Landfill modeling
- Monitoring models
- Composting opportunities

### Health and safety sanitation

- Waste management models
- New sanitation systems planning
- Mapping water storage and sanitation facilities

- III. Application Experiments (per industry advisory group & E. Worker)

## **Appendix A:**

Topic-Specific Tools (pick and choose based on what is used in book)

### Introduction to ArcMap

- Launching ArcMap
- Data navigation techniques
- Elements of the ArcGIS application windows
- Map scale

### Introduction to Global Positioning System (GPS) Technology

- What is GPS?
- The GPS Constellation
- Uses of GPS relevant to GIS
- Identify remote sensing methods of geographic data collection
- Overview of data collection process  
(while referring to user manual for unit-specific instruction)
- GPSTGarmin extension