



7202304

Fundamentals of Geographic Information System



Chapter 1

Introduction to Geographic Information System (GIS)





Learning Objectives

After completing this lesson, students will be able to:

- Define the concept and importance of Geographic Information System (GIS)
- Identify the main components of GIS
- Describe basic applications of GIS in daily life and professional fields
- Understand the relationship between data, location, and spatial analysis



1.1 What is GIS?

A Geographic Information System (GIS) is a computer-based tool that allows users to collect, store, manage, analyze, and visualize geographic data.

GIS integrates maps (spatial data) with information (attribute data) to help users understand relationships, patterns, and trends.

Definition (Esri, 2024): “A GIS is a system that creates, manages, analyzes, and maps all types of data.”



1.2 Components of GIS

GIS technology consists of five main components:

1. Hardware – computers, GPS devices, and servers
2. Software – programs such as QGIS, ArcGIS Pro, and MapInfo
3. Data – spatial and attribute data
4. People – users and experts
5. Methods – procedures and models for analysis



1.3 Why GIS is Important

GIS helps in decision-making and problem-solving in many areas:

- Urban planning and land use management
- Environmental monitoring
- Transportation and logistics
- Disaster management
- Marketing and business analysis

Example: City governments use GIS to plan new roads based on population and environment data.



1.4 Basic Concepts in GIS

- Spatial Data
 - Data related to geographic location
- Attribute Data
 - Descriptive information about spatial data
- Layer
 - A dataset representing a specific theme
- Map Projection
 - Method of transforming the Earth's surface onto a flat map



1.5 Practical Exercise

Objective: Understand basic functions of GIS software

Tools: QGIS or ArcGIS Pro

Activities:

1. Open QGIS software and load a sample shapefile (e.g., provinces of Thailand)
2. Identify layer properties (name, geometry type, CRS)
3. Turn layers on/off to understand visibility
4. Save a map layout and export it as a PDF



Review Questions

1. What are the five main components of GIS?
2. How does spatial data differ from attribute data?
3. Give two examples of GIS applications in real life.
4. What is the function of map projection?