**1.1** **Definition and Key concepts**

**Reading material**

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| Introduction to geographic information system (GIS) data (data type and structure or vector vs. raster data):  Definition of GIS: A system of hardware, software, and procedures designed to support the capture, management manipulation, analysis, modelling, and display of spatially referenced data for solving complex planning and management problems” (Rhind,1989)  GIS components: it is an integration of five components   * Hardware * Software * People * Data * Analysis |
| All the components should be in balance, if the system is to function satisfactorily. |
| **Data Model concept**: Data represent a simplified view of the real world, physical entities or phenomena are approximated by data in GIS (Spatial location, extent of the physical entities, non-spatial properties). Objects or features are abstractions in a spatial database.  Spatial objects are the objects in a spatial database representing real-world entities with associated attributes  In a GIS system, **Coordinates** are used to define the spatial location and extent of geographic objects and **Attribute/non-spatial data** are linked with coordinate data to define each spatial object in the spatial database.  Most conceptualizations or models view the world as set of layers and each layer organizes the spatial and attribute data for a given set of cartographic/spatial objects (e.g., Lake, river, road, etc.) |
| *Source: Concepts and techniques of Geographic Information system, Book by C.P.Lo, Albert K.W. Yeung (2009)* |
| Definition: Attribute data  **Attribute data** are the information linked to the geographic features (spatial data) that describe features. That is, attribute data are the “non- graphic information associated with a point, line, or area elements in a GIS.” Labels affixed to data points, lines, or polygons. |
| Attribute data are categorized as nominal, ordinal, or interval/ratio:   * Nominal attributes: variables that provide descriptive information about an object e.g., colour, vegetation type, city name, owner of parcel, soil type etc. * Ordinal attributes: variables that imply rank order or scale by their values * Ordinal attribute may also be descriptive (e.g., small, medium, large, low, moderate, high, ranging from 1 to 5 (soil erosion level), etc. * Interval/ratio attributes are used for numeric items where both order and absolute difference in magnitudes are reflected in the number * Real number on a linear scale, e.g., area, length, weight, height, depth, value, etc. are represented by interval/ration variables |
| “GIS” is an acronym for Geographic Information Systems, this is the system that creates, manages, analyses, and maps all types of data. On the contrary to the name itself it does not only include geographic type of problems and data but is applicable to different areas of work. For a better understanding of the principles of GIS you can watch the video below:  <https://www.youtube.com/watch?v=P17IRpCXTzs> |

**Exercise materials and tasks**

**Quiz questions**

Instructions: Answer the following five questions to check if you have understood everything so far:

1. What do the letters GIS mean?
2. Geographical Interpretation System
3. **Geographical Information System**
4. Geographical Interpolation System
5. Geoscience Information Software
6. GIS is a visualization tool which brings together
7. **Disparate data and information about a phenomenon together with their geolocation**
8. Data and information about activities that take place in time
9. Disparate data and information
10. What are the components of GIS?
11. Latitude, Longitude, Height, Speed
12. **Software, Hardware, Methods, People, Data**
13. Polygons, Multipolygons, Lines, Polylines, Points
14. What are the things a GIS can do?
15. capturing, storing, analysing, and visualising data related to the time of observation
16. capturing, storing, analysing, and displaying data related to the physical conditions of observation
17. **capturing, storing, checking, and displaying data related to positions on Earth's surface**
18. Which of the following is not an example of spatial data?
19. Polygons showing the area occupied by a particular land use or variable
20. Lines showing the pipeline network
21. Points that showing location of cities
22. **Duration of particular events**