

# *GIST 4302/5302: Spatial Analysis and Modeling*

## *Review*

Guofeng Cao

<http://www.spatial.ttu.edu>

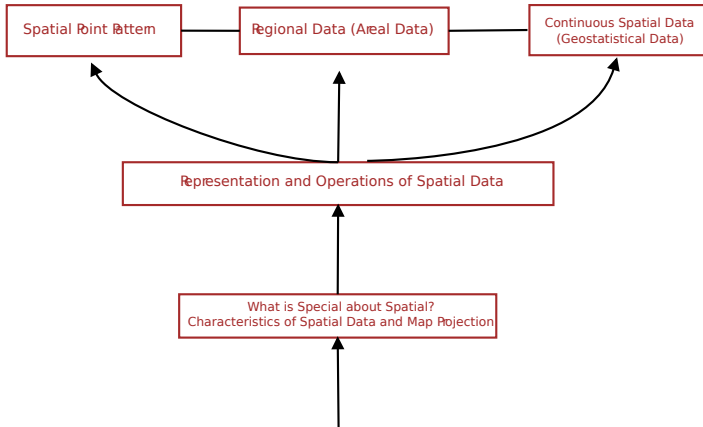


Department of Geosciences  
Texas Tech University  
[guofeng.cao@ttu.edu](mailto:guofeng.cao@ttu.edu)

Fall 2019



# Course Outlines





## Map Projection

- Elements in map projection
  - datum
  - developable surface
  - projection
- Distortions
  - distance
  - shape
  - area
  - direction
- how to choose map projections?
  - depending on purposes, you may need to preserve a certain spatial property - most commonly shape or area - to achieve that purpose



# What is special about spatial

---

## Characteristics of spatial data

- *first law of geography*, spatial correlation (spatial context or spatial pattern in different context)
- *second law of geography*, spatial heterogeneity
  - Simpson paradox in a spatial setting
- fractal behaviors
  - scale issues
  - measuring the length of coastline of Maine
  - travel traces of 'ants' vs. 'elephant'



## Object-based approach

- geometric primitives: points, lines and polygons
- convex hull, Voronoi diagram
- vector analysis
  - point-in-polygon
  - buffer
  - spatial query
  - overlay, spatial join
- data structures for spatial data
  - spaghetti models
  - NAA



## Field-based approach

- representation: points, contours, raster/lattice, triangulation (Delaunay triangulation)
- raster analysis:
  - local operators: map algebra
  - focal operators: focal statistics, aspect, slope
  - zonal operators: zonal statistics, viewshed, watershed analysis

## Object-based vs Field-based

- Pros and cons



## Model builder

- automate processing, graphic programming, reproducibility

## Geocoding

- converting human readable address to geographic coordinate pairs
- what could affect the geocoding results



## Exam format

- Thursday 2:00-3:00pm
- open books and open notes, but access to any digital devices (e.g, phones, tables, computers) are not allowed
- multiple choices (multiple correct answers) plus writing questions





*Thanks*

---

Thank you, any questions/comments