

## Geographic Information Systems in Water Resources

<b>Code</b> CE-892	<b>Credit Hours</b> 3-0
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### Course Description

The course's objectives are to cover the techniques and applications of GIS & RS technologies. It covers the effective use of GIS & RS to analyze and visualize spatial data to gain new knowledge. It also covers the development of maps that communicate well and adhere to the principles of a good map. It covers the knowledge of vector spatial data and georeference raster images, GIS-related spatial analysis and geoprocessing in natural resource management.

### Text Book:

1. Dean Djokic (Ed.), David R. Maidment, Hydrologic and Hydraulic Modeling Support with Geographic Information Systems, ESRI Press.
2. David R. Maidment & Scott Morehouse, Arc Hydro: GIS for Water Resources (Book & CD-ROM), ESRI Press.

### Reference Book:

1. Uzair Shamsi, GIS Tools for Water, Wastewater, and Stormwater Systems, ASCE Press, 2002
2. Baxter E. Vieux, Distributed Hydrologic Modeling Using GIS, Kluwer Academics.
3. John Lyon, GIS for Water Resources and Watershed Management, Taylor & Francis, 2003.

### Prerequisites

None

### ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	30%
ESE	50%

### Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction	Course Outline, objectives, teaching plan, assessment method, concepts review

2-3	Introduction to GIS	Introduction to GIS, Introduction to software ArcGIS, Preprocessing spatial datasets (demonstration through ArcGIS Software), Spatial Interpolation Techniques and applications (demonstration through ArcGIS Software), Georeferencing (Demonstration through ArcGIS Software), Attributes classification methods (Demonstration through ArcGIS Software)
4	Geodesy	Different database systems and their types, Concept of no data in Raster, Different Map Projections and Coordinate Systems, Geodesy
5	Digital Elevation Model (DEM)	Concept of Digital Elevation Model (DEM) and how it is represented, DEM and different types of resolutions, assessment of the quality of DEM and different types of resolution, Digital Data Sources
6-8	Google Earth Engine	Application of Google Earth Engine to generate various spatial datasets (DEM, Landuse/cover soil/geology, climate) and land-use/cover classification
9	<b>MID TERM EXAM</b>	
10-12	Derivatives of DEM	Generating derivatives of the DEM (slope and aspect)
13-17	Watershed Delineation	Delineation of watersheds and streams
8	<b>End Semester Exams</b>	