0

Department of Civil Engineering	
Geographical Information Systems (61620)	
Total Credits	**3**
major elective	
Prerequisites	P1 : Surveying II (61221) OR Surveying II (61322)

Course Contents

The course includes practical training on selected issues of environmental and urban issues with the focus on data collection, storage, analysis and presentation using Geographic Information Systems (GIS). The course also includes applications of theoretical and practical knowledge of spatial analysis.

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	Apply knowledge of spatial analysis in solving realistic engineering problems, especially those with spatial dimension	C K	20 %
2	An ability to properly identify spatial problems and corresponding needs and expectations.	E K	20 %
3	Knowledge of up-to-date spatial and geographic issues	J K	20 %
4	An ability to function in multi-disciplinary teams.	D	10 %
5	An ability to design and conduct experiments, as well as to analyze and interpret spatio-temporal data.	B K	20 %
6	An ability to communicate effectively	G	10 %

Textbook and/ or Refrences

Bolstad, P. (2007). GIS Fundamentals: A First Text on Geographic Information Systems , 3rd Edition. Eider Press. Booth, B. &Mitchel, A. (2001). Getting Started with ArcGIS. ESRI Press. Burrouch, P. (1986). Principles of Geographical Information Systems for Land Resources Assessment. Clarenson Press. DeBy, R., Knippers, R. &Sun, Y. (2001). Principles of Geographic Information Systems: An Introductory Textbook. ITC Educational Textbook Series 1. ESRI (Environmental Systems Research Institute) (2002). Using ArcGIS Spatial Analyst. ESRI Press. Foresman, T. (1998). The History of Geographic Information Systems: Perspectives from the Pioneers. Prentice Hall PTR. Hrmon, J. &Anderson, S. (2003). The Design and Implementation of Geographic Information Systems. John Wiley &Sons, Inc. Ormsby, T., Napoleon, E., Burke, B. &Groessl, C. (2010). Getting to Know ArcGIS Desktop. ESRI Press. Steinberg, S. J. &Steinberg, S. L. (2006). Geographic Information Systems for the Social Sciences: Investigating the Space and Place. SAGE Publications.

Assessment Criteria	Percent (%)
First Exam	15 %
Second Exam	20 %
Homeworks	10 %
Projects	5 %
Final Exam	50 %

Course Plan

Week	Topic
1 &2	Introduction to GIS - The evolution of GIS and its academic origins - What is GIS - Components of GIS - Fields of GIS applications Lab Exploring Arc Map and Arc Catalogue
3 &4	Spatial Database Structures and Data Models - Vector data model - Raster data model -

	Vector vs. raster data models Lab Introducing basic vector and raster tools
5-7	Vector Data Analysis - Topology - Attribute based analysis - Levels of measurements - Vector spatial operations Lab Working with attributes: investigating Data Management and Data Analysis toolboxes
8-10	Raster Data Analysis - Introduction to Map Algebra - Raster spatial operations Lab Working with raster data: investigating spatial analyst toolbox
11-12	Applications of GIS - Four case studies related to the students interests. Lab In class mini projects
13-15	GIS in Practice - Planning a GIS project - Data collection and assembling - Data preparation - Data analysis - Data presentation Lab Working on the final project