Geographic Information Systems (GIS)

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Outline: Geographic Information Systems (GIS) is a computer-based tool that uses spatial data to analyze and solve real-world problems. This course is designed to introduce the student to the basic principles and techniques of GIS with as objective to develop an understanding of geographic space and how maps represent geographic space. A student will be able to read maps, as well as write about and discuss information gleamed from maps. By the end of the GIS module, students will be creating maps from sources both graphical and tabular data using ArcMap. Students will be able to use GIS to build maps using data they collected during program. Students will present and discuss their mapping work based on data collected from different sources using PowerPoint presentation.

Module Grading:
Group Project: 60%
Quiz: 25%
Class Participation: 15%

Assignment:
Students will be given assignments based on activities performed during the class. The examples of assignments includes: (1) importing data with latitude and longitude coordinates in GIS and creating maps, (2) Import excel or other data formats data in GIS and joining it Global or Local maps to create new maps using imported datasets. Students need to submit the assignment in 2 days of time. Since, these assignments are about creating maps, students will have 3 attempts to improve their maps and submit on the blackboard.

Group GIS Project:
Students are divided in several groups with 3-4 students in each group. In the GIS project, students are free to choose Earth System Science related topic, in consultation with the instructor. The project should have rich GIS elements. Students will be downloading data from various government website sources including: Census bureau, NOAA, NASA, USGS, DOL, World Bank, UN, and educational institutes, etc. The grading in GIS project is based quality of GIS maps produced, presentation skills, effort in data processing and preparation, and analysis of data. Students are encouraged to ask questions after presentations.

Mode of Presentation:
The PowerPoint slides will be used to class material on projector. Also, the computer and projector is used to show how to use ArcGIS software and their functionalities.

Communication:
Blackboard will be used for official communication outside the classroom. Students are expected to check their Blackboard account at least once a day.

Section 3: Geographic Information Systems (GIS)

Class 1 – Introduction to GIS
- An overview of GIS
- Concept of Vector and Raster
- Feature model and example of features
- How GIS data are captured, stored, retrieved, analyzed & displayed
- How to use ArcMap
- Introduction to shapefiles

Class 2 – Introduction to ArcMap
- Importing remote sensing data/images
- Importing and processing tabular data for GIS

Class 3 – Data analysis and mapping
- Editing data layers
- Analyzing GIS data
- Mapping the GIS data
- Selection of group GIS project
- Searching GIS data for project

Class 4 –Remote Sensing data and GIS
- Downloading the remote sensing (Glovis, NASA)
- Importing remote sensing data in ArcMap
- Supervised Classification of Remote Sensing (LandSat) data in GIS

Quiz: GIS Data type, data analysis

Class 5 – GIS project
- Creating/importing data
- Data plotting and analysis
- Analysis/plotting of GIS data
- Presentation of GIS Project

Project: students will independent project based on their area of interest. Instructor will help student in acquiring and processing data that will be imported in GIS framework.