**Palestine Polytechnic University**

**College of Engineering**

***Department of Civil & Architectural Engineering***

**Course:** (5210 ) Geographic Information System **Credit Hours:** 3

**Prerequisites:** (5173) Geodesy & Astronomy

**Student workload:** Attendance 5 hours/week & Self Study 5 hours/week,

**Course Staff:**

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| --- | --- | --- | --- |
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**Course Description**

This course provides students with principles of Geographic Information System this computer based system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. Used for mapping and analyzing things that exist and events that happens on earth. How to integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. Abilities to use GIS in a wide ranges of public and private enterprises for explaining events, predicting outcomes, and planning strategies.

The special feature of GIS is that each row of attribute data is also represented by coordinates and thus can be mapped, using the combination of attribute and spatial data GIS combine information on what is the object and where it is located for each feature in the database. The fact that there are both spatial and attribute data allows the database to be exploited in more ways than a conventional database.

Part of this course will be conducted as CBL, Community Based Learning (CBL) is a pedagogical approach that is based on the premise that the most profound learning often comes from experience that is supported by guidance, context-providing, foundational knowledge, and intellectual analysis. The opportunity for students to bring thoughtful knowledge and ideas based on personal observation and social interaction to a course's themes and scholarly arguments brings depth to the learning experience for individuals and to the content of the course. The communities of which we are a part can benefit from the resources of our faculty and students, while the courses can be educationally transformative in powerful ways.

Course Objectives: The course aimes to achieve the following objectives:

1. Introduce to the students the terminology of GIS, it’s applications, the GIS system components, Vector and Reater data sets, representation of topography with Contours DEM and TIN.
2. How to acquiring spatial data by digitization of maps or from othe sources such as Land surveying, GPS, Photogrammetry, and Remote Sensing.
3. Georeferencing the maps, distinguishing between Spatial Spectral Radiometric Resolution.
4. Topology it’s rules and elements.
5. Data quality within GIS and types of errors in the spatial data.
6. Querying and anlysing Database with Vector or Raster data types
7. Dispalying Spatial data in three dimention.

**Intended Learning Outcomes:**

Upon the completing the course, student should be able to

* Produce Spatial data free from Topological errors
* Reprojecting data from different map projections and coordinate Systems.
* Analyzing Geographic database.
* Perform spatial analysis with Vector database.
* Perform spatial analysis with Raster database.
* Perform 3D models and Model buildings.
* Perform pilot project in GIS to ensure accomplishing the previous outcomes.

**Teaching Method**

In the earlier part of the semester, classroom sessions will typically begin with a lecture, setting out conceptual ideas and issues. Lectures will typically be followed by in-class exercises, involving case analysis, self-assessment, and creative problem solving. Week 8 -12 of the course will be conducted as CBL and students should perform a GIS project benefited from the field work to collect the appropriate data and make a visits the municipalities or ministries to collect the data needed for their projects.

**The CBL project will take the following steps:**

1. Groups forming, each group consist of two to three student, the instructor will determine the pilot area for each group.
2. Organisation selection, the students them selfs will determine the organization to visit, or benefits from field work to collect the needed information.
3. Visit the organization to benefit from their experiences, and benefits from the available data.
4. Since this project needs some field work to collect the data, here we ensure that the students must take care of themselves and ensure a high safety and don’t expose themselves to risks.

**Communication and Follow up**

In addition to the class meeting and e-mails student must register in the facebook group of the class and he\she must keep up with the updates, notes, discussions, etc presented in the group.

**Text Book:**

The Required texts for this course are:

* Ian N Gregory, - A guide to using GIS in historical research, 2nd Edition,Ian Gregory 2005.
* Spatial Information Management Unit Office of the Premier,Eastern Cape, South Africa, A Gentle Introduction to GIS / T. Sutton, O. Dassau, M. Sutton, 2009.
* Otto Huisman and Rolf, Principles of Geographic Information System, © Paul Klee, Chosen site, 2001
* In addition to materials supplied throughout the course.

**Course Philosophy**: Learning is an active process from the teacher's and from the learner's points of view. Teachers and students have a strong responsibility to one another. My obligations as a teacher include (a) being knowledgeable and current on the subject matter, (b) planning and providing good learning experiences, (c) evaluating work fairly and promptly, and (d) assisting you to meet the course objectives and to fulfill your own needs. Student obligations include (a) preparing and completing assignments, (b) participating actively and positively in the learning process, and (c) expressing needs to the teacher.

**Ethics and Integrity**: We expect you to uphold the highest ethical standards, be honest, and practice academic integrity. This includes doing original work and citing sources, including the work of students

**Assessments measures and grading system:**

Mid-term Exam 30% (15% Theory & 15% Practical)

CBL Project 20%

Practical exercises & H.W 15%

GIS case presentation 5%

Final Exam 30%

\*The grades will be on the project that you will submit and present at the end of the course. The assessment of project will be curried by instructor 20 grades (5% for maps, 5% organization of the database, 5% digitization, 5% calculations and report).

**Course Outline and Calendar**

|  |  |  |  |
| --- | --- | --- | --- |
| Main outcomes | Special outcomes | Week | Comments |
| Introducing GIS | * GIS definitions.
* Terminology of GIS.
* GIS Applications areas.
* GIS system components
 | 1 Week |  |
| World as viewed through a GIS  | * Attribute data
* Vector and raster data.
* DEM, TIN, Contours
 | 1 Week |  |
| Acquiring spatial data | * Scanning maps to produce raster data.
* Digitizing maps to produce vector data.
* Important source of data for GIS
 | 1 Week |  |
| Topology  | * Topology errors
* Topology rules and importance
* Topology tools
* Features and topological elements
 | 1 Week |  |
| Data quality within GIS  | * Types of errors in data collection
* Source of errors in spatial data
* Factors affecting the reliability of spatial data
* Error Resulting From Rasterizing a Vector Map
* Errors associated with digitizing a map, or with Geocoding
 | 1 Week |  |
| **For the Practical part** |
| GETTING STARTED WITH ArcGIS10.2 |  |  |  |
| Exploring GIS concepts | * Basic tools of ArcMap10.2
* Explore a sample of GIS concepts
* Select geographic features based on certain conditions
 | 1 Week |  |
| Displaying data | * Start your applications and add a polygon layer
* Add a layer for a polygon shapefile
* Change a layer name
* Use the definition Query
* Classify and symbolize data
* Label features
* Add a HALO to the Labels
* Create a Layer file
 | 2 Week |  |
| Querying your database | * Add Map Tips
* Identify a feature
* Find a specific feature
* Make spatial Query
* Calculate statistics for your selection
* Create a selection layer
* Explore other spatial selections
* Explore Attribute selection
* Save layer in another formate
 | 1 Week |  |
| Working with spatial data | * Folder connection
* Work with the contents view
* Working with preview tab and explore a shapefile
* Explore a Geodatabase
* Explore a CAD data source
 | 1 Week |  |
| Working with tables | * Examine Geodatabase Tables
* Examine table Cardinality
* Create the Join
* Modify the appearance of the Joined table
* Create the Relate
* Make a selection and examine the related table
 | 1 Week |  |
| GeoReferencing and Editing in ArcGIS | * Image Viewer window
* Image Viewer window
* Georeferencing a raster to another raster
 | 1 Week |  |
| Spatial analysis with vector and Raster data | exercise | 1 Week |  |
| Projects discussion |  | 1 Week |  |
| Final exam |  |  | Week 16 of the semester |

**Important Dates and Instructions**

* Finding a GIS topic for presentation.
* Conducting GIS project week 8-13
* Presenting the GIS topic week 8-14
* Presenting the GIS project week 14-15
* Mid-term Exam (Theory + Practical) week 8
* Final Exam week 16

**Course Policies:**

* **University policies:** The student should know all university policies related to his study, published by the registrar's office.
* **Attendance policy:** Regular attendance is required at all class meetings, the instructor will be the last one enters the class, please do not disturb (knocking the door, moving chairs…).
* **Missed Exams:** No make-up exams should be given. Excuses must be to the student's academic supervisor, he has the right to accept or deny the student's petitions.
* **Homework's and reports:** Homework's and reports must be submitted on the due date, no late homework's or reports can be accepted.
* **Academic dishonesty policy:** You are expected to read and understand the academic dishonesty policy published by the registrar's office. It will be performed in this course.