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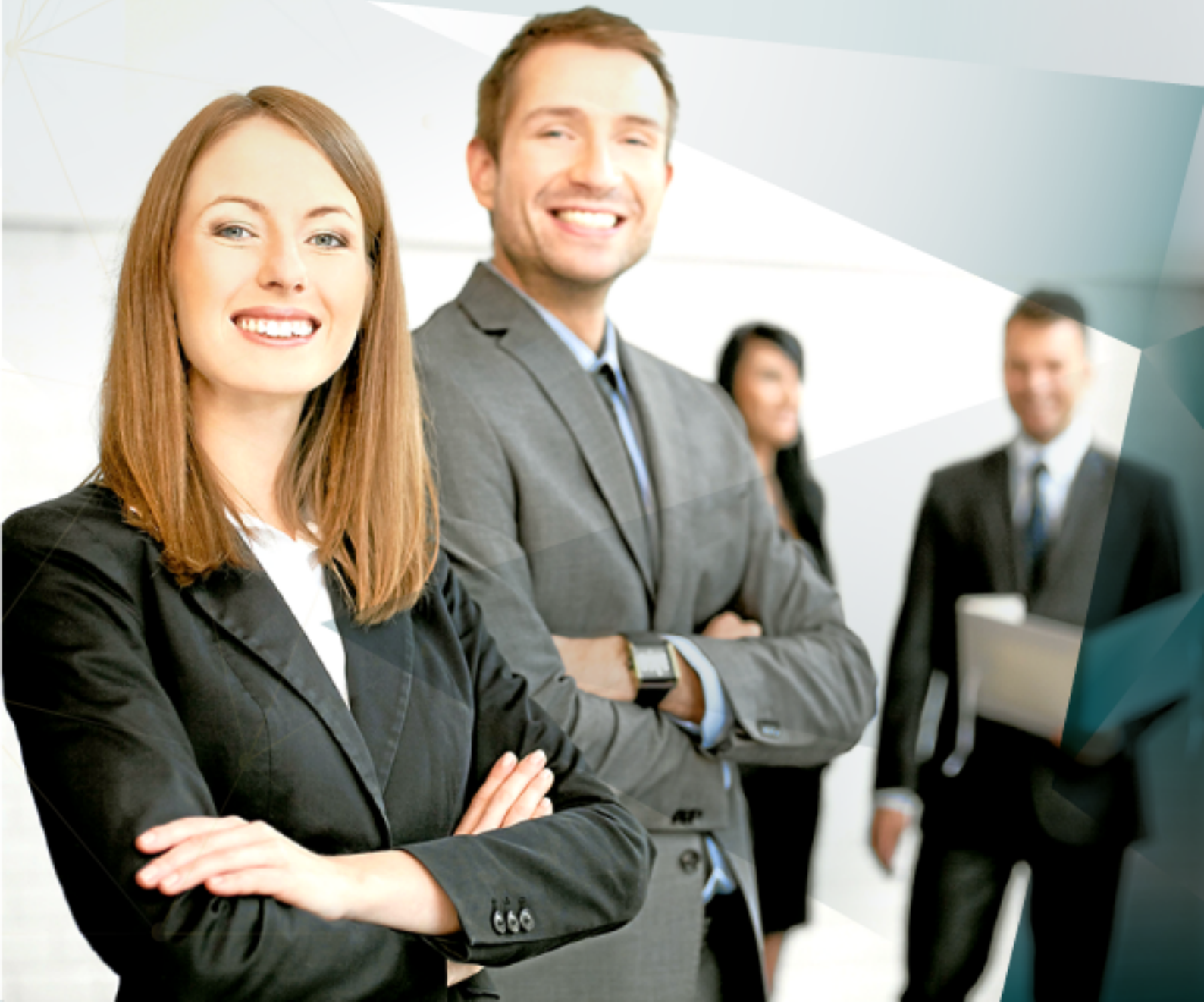
Geographic Information Systems (GIS) Training

10 - 21 Feb 2025
Brussels (Belgium)



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Geographic Information Systems (GIS) Training

Ref.: 15034_247789 **Date:** 10 - 21 Feb 2025 **Location:** Brussels (Belgium) **Fees:** 9500 **Euro**

Introduction to Geographic Information Systems GIS:

Understanding Geographic Information Systems GIS is a pivotal skill in various fields, from environmental science to urban planning. This specialized course, provided in collaboration with Esri, the developers behind the renowned ArcGIS software, is designed to equip participants with the knowledge and practical experience required to employ GIS technology effectively in various professional scenarios.

Students will master the art of spatial data analysis, develop advanced cartographic skills for effective map-making, and learn collaborative methods pertinent to GIS and related fields. The curriculum will culminate in a Capstone Project. Participants will create a professional GIS portfolio, showcasing their data identification and collection abilities, analytical map creation, and spatial analysis.

A dedicated GIS geographic information systems course for those aiming to become a Certified Geographic Information Systems Professional CGISP, covering the essentials of the certification process, the skills required, and how this certification can further their career in GIS.

Target Audience:

- Engineers.
- Architects.
- Contractors.
- Individuals are interested in applying GIS within their professional arena.

Course Goals:

By the end of this GIS geographic information systems course, participants will be able to:

- Discuss the functionalities and applications of a GIS.
- Generate GIS maps using industry-standard software like ArcMap.
- Access and perform queries on a GIS database.
- Apply cartographic techniques to exhibit data with symbology and labels.
- Recognize and utilize primary GIS data formats.
- Conduct elementary GIS analysis.

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Key Competencies:

Upon the end of this GIS geographic information systems training, key competencies will be able to:

- Cartographic principles.
- Experience realistic tasks in the context of international case studies.
- Wildlife conservation and leisure hiking to archaeology and disaster relief.
- Creating maps.
- GIS spatial elements.
- Some basic topological relationships.
- The DIME topological structure.
- Data normalization.
- Digital image analysis.
- Surveying and mapping.

Advanced Geographic Information Systems:

This GIS geographic information systems course will outline the roles and responsibilities of Geographic Information Systems Specialists and GIS Analysts and discuss the skills and knowledge necessary to excel in these positions within various industries.

This segment will delve into advanced GIS topics, pushing the boundaries of spatial analysis and data management. It will also discuss the GIS training certificate program, offering guidance for those seeking formal recognition of their GIS skills.

Prospects for further education, such as a Master's degree in Geographic Information Systems, will be addressed, outlining potential academic paths and career advancement opportunities. Participants will explore comprehensive techniques and concepts in GIS, including spatial analysis, data manipulation, and the intersection of various data types.

Detailed Course Content:

Unit 1: Introduction to GIS Geographic Information Systems:

- Information systems.
- Management Information System MIS - Decision Support System DSS - Expert Systems.
- Integrated Information System. Data, Information, Knowledge.
- Geographic information and GIS.

Unit 2: What is GIS:

- Some GIS definitions. Other Terms Used for GIS.
- Database management system graphic and non-graphic data.
- Software for manipulating, displaying, and plotting data.
- Algorithms and techniques for spatial analysis.

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Unit 3: Components of GIS:

- Hardware.
- The central processing unit CPU, auxiliary storage, and input-output units.
- Software.
- Main package Arc/InfoESRI, Microstation, Application package.
- Data.
- "spatial" or "geographic"?
- Accuracy, Precision, Time, Currency, Completeness.
- Data organization.
- Decision Model.
- Valid Criteria.
- Georeferenced Data.
- Data Layers.
- User People.

Unit 4: Data Processing Steps:

- Data input and conversion, Data management.
- Data processing.
- Data analysis and modeling.
- Data output.

Unit 5: Regular Tasks Accomplished in a GIS:

- Display on the screen.
- Edit, change, transform.
- Measure distances and areas.
- Combine maps of the same area.

Unit 6: What is GIS Used For?

- Municipal Spatial Data.
- Basemaps/topographic maps.
- Cadastral maps lot boundaries, parcel boundaries, easement, and right-of-way.
- Urban planning maps.
- AM/FM Data sewer system, water system, electricity, communication.
- Street network Data road centerlines, intersections, lights, and trees.
- Area Data demographic, tax rate, school district, and emergency response.
- Environmental Data soil map, flood plain maps, noise level map, streams, water bodies, and parks.

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Unit 7: Applied GIS Geographic Information Systems:

- Problem types.
- Location: What is at?
- Condition: Where is it?
- Trend: What has changed since?
- Routing: What is the best way?
- Pattern: What special patterns exist?
- Model: What if?
- What is GIS based on knowledge?
- Remote Sensing, Geodesy, Photogrammetry, Surveying, Cartography, Computer science, Mathematics, Statistics.
- Disciplines using GIS.
- Geodesy and Geomatics, Civil Eng., Geology, Early Applications of GIS.
- Current GIS applications
- Business.
- Census, elections.
- Surveying and mapping.
- Map and database publishing.
- Public health and safety hospital, police, and fire.
- Real estate information management.
- Municipal Applications infrastructure.
- Engineering Applications.
- Forest Development and Management/Erosion and Deforestation.
- Agriculture and land use, harvest prognoses.
- Environmental applications vegetation and pollution.
- Hydrology, water pollution drainage patterns and water catchment.
- Geology DTM, fault-line detection, and mineral detection.
- Transportation, vehicle tracking, and navigation systems.

Unit 8: Benefits and Costs of GIS:

- Large data volumes make costs drop and improve accuracy and precision.
- GIS costs.
- Capital.
- Operating costs.

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Unit 9: CAD/CAM Systems, History of GIS? GIS Information Sources:

- Books, magazines, journals, and conferences.
- Data Input into GIS.
- The importance of Data.
- GIS maps are digital, not analog.
- Real and Virtual Maps.
- GIS Data Conversion.
- Traditionally, most of the cost of a GIS project.
- Data collection is time-consuming and expensive, but it is a one-time cost.
- Captured from analog maps by GEOCODING.
- Digitizing: manual digitizer, automated photogrammetry and stereoplotter.
- Scanning image size, resolution, and vectorizing.
- Field data collection remote sensing To reformulate.
- Remote sensing data acquisition steps.
- Electromagnetic radiation spectrum.
- Passive and active remote sensing.
- Sensor platforms, satellite orbits, and swaths.
- Spatial and temporal resolution slide 55.
- Land Observation Satellites and Sensors slide 56.
- Digital image analysis.
- Pre-processing.
- Geometric Restoration rectification and geocoding?
- Radiometric Restoration.
- Display and Enhancement.
- B&W and color-composite display.
- Zoom in and zoom out.
- Contrast manipulation.
- Image algebra.
- Spatial filtering.
- Principal Component Analysis.
- Texture analysis.
- Digital Elevation Models DEM.
- Information Extraction.
- Classification Supervised classification, Unsupervised?
- Radar image processing analysis.
- Hyperspectral data analysis.
- Digital photogrammetry extracts DEM and orthophoto graphs.
- Geographic Information Systems GIS?
- Raster-based GIS.
- Vector-based GIS.
- Image and Cartographic Map Composition.
- Integrated Image Analysis and GIS.
- Alternative data entry methods.
- GPS.
- Surveying.
- Existing digital data.
- Attribute Data.
- Table with rows and columns.
- Editing and Validation.
- Data are incomplete or double.

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- Data needs to be in the right place or digitized incorrectly.
- Data is at the wrong scale and data is distorting.

Unit 10: GIS Coordinate Systems and Map Understanding:

- Definition of the map.
- Topographic, thematic, line, and photo maps.
- Understanding Maps.
- Scale.
- Contour interval.
- Map projection and datum.
- Map accuracy.
- Understand how to answer general questions using maps.
- Traditional uses: Navigation land, sea, air, engineering, urban, regional, and national planning, Infrastructure planning and design, Terrain analysis, and National Defense.
- Plane Coordinate Systems.
- Cartesian, polar coordinates and Their interconversion.
- Three-Dimensional Systems.
- Earth Coordinate Geometry.
- Rotation of the earth and equator.
- Parallels, meridians, and degrees/minutes/seconds.
- Great and small circles.
- Reference ellipsoid, geodetic datum, and WGS94.
- Earth models: Flat, Spherical, Ellipsoid, and Geoid.
- Global coordinate systems.
- Datums: local, regional, global, and Shifts.
- Datums.
- Geodetic latitude, longitude, and height.

Unit 11: Map Projections:

- Definition: Map Projection.
- Types of Map Projections.
- Conformal Orthomorphic projections.
- Equal area Homolographic projections.
- Equidistant projections.
- Equi Direction projections.
- Cylindrical, azimuthal, and conical projections.
- The aspect of map projections: normal, transverse, and oblique.
- Properties of the projections.
- Lambert Conical Projection.
- Mercator's Projection conformal.
- Universal Transverse Mercator Projection UTM.
- K.Eren/Joe-Tek Lambert Conical Projection.
- Transformation of the Map Projections.
- Analytical Methods.
- Polynomial Transformation.
- Direct grid-on-grid transformation.
- Selecting a suitable map projection.
- Criteria influencing the selection of a map projection.
- Some general rules tropical areas: cylindrical.
- Young's rule.

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Unit 12: Database Management:

- Data management concepts.
- First, second, and third-generation data management.
- DBMS, components, advantages, and disadvantages.
- Components of a DBMS.
- Data schema. Type, attributes, relationships.
- Formal schema, table-based schema, and flat-file database.
- Database instance vs database schema.
- Database design stages: conceptual, logical, and physical design.
- DBMS's main components are data definition language, Data dictionary, Data-entry module, Data update module, Report generator, and Query language.
- Data models: hierarchical, network, relational. Relations one-to-many.
- Relational database management systems RDBMS.
- Common key attribute.
- Procedural and non-procedural query languages.
- Retrieval operations sort, renumber, subset, search.
- GIS is a database user interface.
- Spatial retrieval operations.
- Concepts of the domain, atomic values, and keys.
- Data normalization.
- Data structures.
- Spatial data structures key, entity, classification code, feature code, topological relationships, and data source.
- Spatial features size, distribution, pattern, contiguity, neighborhood, shape, scale, and orientation.
- GIS analysis of spatial data.
- Points symbol operations.
- Line symbol operations.

Unit 13: Spatial Data Models:

- GIS spatial elements.
- Coverages and tiles.
- Value, shape, Location, and Spatial reference.
- Vector versus raster.
- Conversions between vector and raster.
- Raster data model.
- Value, shape, Location, and grid structure.
- Mixed pixel.
- Data compression.
- Quad-tree structure.
- Vector data model.
- Points, lines, and polygons.
- Spaghetti data model.
- Topology connectivity, orientation, adjacency, and containment.
- Nodes, arcs, and polygons.
- Topology.
- Some basic topological relationships.

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- The DIME topological structure.
- The POLYVRT topological structure.
- Arc topology.
- Relational spatial join.
- Topology building, network building, and polygon building.
- Topological overlay.
- Common errors in spatial data.
- Vectors and 3-D.
- Triangulated Irregular Network TIN.
- Delaunay triangulation.
- Spatial data formats.
- Common data formats.
- TIGER/LINE data format.
- Standards for format conversion.
- The Open GIS Consortium OGC.
- Spatial data on the internet.

Conclusion:

Upon completing the course, participants will receive a Geographic Information Systems Certificate, recognizing their competency in using GIS technology and indicating their readiness to apply these skills professionally.

A concluding GIS geographic information systems training will reflect GIS's extensive benefits across multiple domains, emphasizing its importance in contemporary decision-making and strategic planning processes.

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Registration form on the :
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