



Mastering GIS Diploma

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Training Environment:

Training will be conducted at the BeGISer or client premises site (classroom format).

Training Scope:

The training of the GIS End-user (Non-Professional), Professional users, and System Admins.

An introduction

This document serves as a guide for the **Mastering GIS Diploma** course.

The course is designed for undergraduate students or recent graduates with no prior knowledge of GIS, particularly those in the GIS field who aim to transition from using ArcMap to ArcGIS Pro.

About this Course

Are you accustomed to navigating ArcMap with ease, perhaps even considering yourself a power user? Or do you find yourself following established routines within specific ArcMap workflows? Transitioning to ArcGIS Pro offers a fresh experience, characterized by a project-based file structure, updated terminology, and a host of new tools and capabilities. While these changes may initially seem daunting, you'll likely come to appreciate the modernized approach once you've familiarized yourself with it.

ArcGIS Pro represents a significant evolution for GIS professionals, offering enhanced capabilities for mapping, advanced analysis, and the management of 2D, 3D, and 4D data. Furthermore, its seamless integration with ArcGIS Online and ArcGIS Enterprise facilitates effortless content sharing. Throughout this course, instructors will introduce you to key ArcGIS Pro terminology and components, guiding you through the process of migrating maps and other assets from ArcMap. Additional resources will aid ArcMap users in smoothly transitioning their GIS workflows to ArcGIS Pro.

Expand your foundational GIS knowledge, acclimate yourself to the ArcGIS Pro environment, and explore various common GIS workflows. This course provides instruction on techniques and best practices for mapping, data management, analysis, and resource sharing. Through hands-on exercises, you'll gain the proficiency needed to effectively utilize ArcGIS Pro.



Course 1: GIS Fundamentals

Course Duration:

3 Days, 9 Hours

Course Description:

In this course, you will find information about what GIS is, and the basics of GIS (Data types, software, etc.). **we** will give you an overview of GIS and what's great about it, help you understand key concepts underlying GIS technology and data types to use, and help you start making GIS maps. We will learn some of the basics of map design and production, what coordinate systems and projections are, the fundamental components and capabilities of GIS, and discover how ArcGIS can help organizations address business needs. You will also learn the basics of Geographic Information Systems (GIS) that any GIS specialist needs. These basics include coordinate systems, data collection methods, spatial analysis, and how to use different tools to analyze geographic data. Additionally, we will cover GIS tasks, data management, and how to organize and store geographic data effectively. We will explore different types of software and how to use each program, the most important positions and jobs held by a GIS specialist, the sectors in which GIS works, and notable projects implemented using GIS.

Course Objectives:

- Understand fundamental concepts that underline the use of GIS.
- Explain how ArcGIS enables organizations to address business needs.
- Describe the components of ArcGIS.
- Explore common data models used to represent real-world features and phenomena in a GIS.
- Discover how a GIS accurately maps feature locations.
- Evaluate data for use in a GIS mapping project.
- Visually analyze feature relationships and patterns on a GIS map.
- Share GIS maps and analysis results.
- Identify appropriate data to support a mapping project.
- Create a map, add data to it, and symbolize map features to support the map's purpose.
- Share data, maps, and other content to an organizational portal.
- Design Maps and layouts.
- Playing with coordinate systems.

Course TOC:

- Section 1: Definitions and terms.
- Section 2: Map Design and Production.



Course 2: GIS Data Management

Course Duration:

9 Days, 27 Hours

Course Description:

This course will help you build the skills needed to store, organize, update, and disseminate accurate data that supports sound decision-making. The foundation of GIS is spatial data, which includes location information and is used daily, often without consciously recognizing it as spatial data. In GIS, two models map spatial data: vector features and raster. In this course, you will learn foundational concepts of spatial data.

When starting a GIS mapping or analysis project, a common challenge is assembling the data needed to answer questions or produce the desired output. The datasets you need may be available but at different accuracy levels, or they may include the required geographic features but lack key attributes. Many issues can make data unusable as-is. This course explores data-preparation techniques relevant to various GIS applications, helping you gain essential skills to assess data quality, address inconsistencies, and deliver valid results from your GIS projects.

Additionally, you will delve into the geodatabase, the native data storage format for ArcGIS software. Best practices for creating a geodatabase to centrally store and efficiently manage your organization's authoritative geospatial data are covered. You will develop the skills needed to configure unique geodatabase features that ensure data integrity and accuracy over time, and gain a thorough understanding of file and enterprise geodatabase capabilities.

Course Objectives:

- Identification of data requirements for specific projects and finding authoritative sources for data acquisition.
- Assessment of dataset quality including spatial, temporal, and thematic accuracy, logical consistency, and completeness.
- Creation of metadata to document dataset quality.
- Description of the two spatial data models used for representing real-world features and phenomena.
- Practical usage of ArcGIS Pro for exploring both vector and raster data.
- Understanding different methods for storing and accessing GIS data.
- Creation of a geodatabase for efficient organization and management of geographic data.
- Designing geodatabase topologies and understanding editing workflows within a geodatabase.
- Deployment of recommended editing workflows for updating both 2D and 3D data.
- Application of ArcGIS best practices to ensure data accuracy over time.
- Assessment of the most suitable type of geodatabase for organizational needs.
- Preparation of data for analysis and definition of data rules and relationships to ensure data integrity.



- Configuration of access to an enterprise geodatabase and creation of versioned feature classes for multiple concurrent editors.
- Application of ArcGIS Pro tools and techniques to address quality issues, correct errors, and create new data.
- Documentation of dataset quality through metadata creation for easy assessment by others.
- Identify appropriate data to support a mapping project.
- Addition of data to a geodatabase, including editing feature geometry and attributes.
- Creation of a mosaic dataset for storing and disseminating imagery.
- Organization of GIS data using geodatabase components.
- Understand fundamental concepts that underline the use of GIS.
- Identification of key characteristics of GIS data.

Course TOC:

- Section 1: Spatial Data Creation.
- Section 2: Spatial Data Design.
- Section 3: Data Conversion.
- Section 4: Spatial Data Validation.
- Section 5: Spatial and Tabular Data Relations.
- Section 6: Data Engineering.
- Section 7: Data Management Using Analysis Tools.
- Section 8: Workflows in ArcGIS Pro.



Course 3: Implementing Web GIS

Course Duration:

3 Days, 12 Hours

Course Description:

This course provides an introduction to web maps, apps, and other authoritative content available through your ArcGIS Online organizational site. You will learn how to explore, utilize, create, and share content that enhances projects with geographic context, additional business intelligence, and visual impact. The concepts covered in the course are also applicable to ArcGIS Enterprise portals.

ArcGIS Online empowers knowledge workers across organizations to access, create, and share web maps and apps from anywhere and at any time. Through this course, you will gain an understanding of ArcGIS Online capabilities, how to publish content to an ArcGIS Online organizational site, create web maps and apps, and manage common ArcGIS Online administrative tasks.

The course demonstrates how to publish data and map layers to ArcGIS Online as services. You will learn to construct a web map and convert it into a web app, expanding your abilities to effectively communicate and share spatial information.

Course Objectives:

- Defining basic ArcGIS Online terms.
- Distinguishing between basic ArcGIS Online uses and capabilities.
- Modifying your ArcGIS Online organization's settings.
- Organizing and managing ArcGIS Online content to enhance discoverability within your organization.
- Accessing web maps, apps, and other GIS resources shared within an ArcGIS Online organizational site.
- Publishing GIS data as services to an ArcGIS Online organizational site.
- Creating, configuring, and sharing web maps and apps.
- Applications Design like ArcGIS Dashboard, Web App Builders, Survey123, etc...
- Sharing maps and other content on your ArcGIS Online organizational site.
- Publishing hosted feature services and tiled map services.
- Ensuring the appropriate level of sharing to meet users' needs.

Course TOC:

- Section 1: Web GIS Fundamentals.
- Section 2: Web Maps Design.
- Section 3: Web GIS Application creation.



Course 4: Spatial Data Analysis

Course Duration:

15 Days, 45 Hours

Course Description:

Spatial analysis is an essential tool for understanding our world, and it encompasses six key categories. These categories help answer geographic questions by following a spatial analysis workflow. By applying this workflow, you can explore, analyze, and produce reliable information from spatial data using various ArcGIS tools. Geoprocessing provides a framework for processing geographic and related data, allowing users to perform spatial analysis and manage GIS data efficiently. The Overlay toolset in ArcGIS Pro facilitates analysis by uncovering and quantifying spatial relationships between features.

Modern spatial analysis and data science capabilities in ArcGIS enable users to solve spatial problems through data engineering, exploration, visualization, and statistical and machine learning techniques. Concepts like Hot Spot Analysis and Cluster and Outlier Analysis are introduced, along with foundational skills for interpreting results.

Suitability modeling guides decisions about where businesses or habitats should be located. This course teaches how to define analysis goals and suitability criteria, prepare data, and create weighted or simple suitability models.

Course Objectives:

- Find efficient routes over a fixed infrastructure.
- Describe the Hot Spot Analysis and Cluster and Outlier Analysis tools.
- Explore techniques such as terrain analysis, visibility analysis, feature extraction, and volumetric modeling.
- Summarize the image classification techniques available in the ArcGIS platform.
- Find the closest facilities.
- Employ vector overlays to allocate variables between features, analyze feature relationships, and perform surface, visibility, and volumetric analysis.
- Perform surface analysis.
- Gain hands-on experience performing suitability analysis, predictive modeling, space-time pattern mining, and object detection.
- Explore ArcGIS technology for performing spatial analysis.
- Explain various data summarization methods.
- Explain the concepts that underlie distance analysis.
- Perform a suitability analysis
- Gain foundational knowledge of Spatial Data Science and advance your problem-solving skills by leveraging ArcGIS technology for spatial analysis.



- Perform location-allocation.
- Prepare data and select appropriate tools and settings for analysis, examining features and distribution patterns in both 2D and 3D.
- Use ArcGIS data engineering methods and visualization tools to prepare data effectively.
- Define problems suitable for modeling, prepare data accordingly, and summarize available image classification techniques within the ArcGIS platform.
- Understand how statistical cluster analysis can inform decision-making, describing key concepts and tools like Hot Spot Analysis and Cluster and Outlier Analysis.
- Modeling and scripting
- Use the geoprocessing framework to conduct analysis, controlling output data properties through environment settings.
- Utilize spatial statistics to quantify patterns and identify emerging hot spots, employing interpolation and regression analysis for pattern explanation and prediction.
- Perform visibility analysis.
- Follow a systematic analysis workflow to solve spatial problems, understanding the types of questions that spatial analysis can answer.
- Change detection

Course TOC:

- Section 1: Introduction to Spatial Data Analysis.
- Section 2: Network Analyst.
- Section 3: Perform a suitability analysis.
- Section 4: Change detection.
- Section 5: Charts.
- Section 6: Data Engineering.
- Section 7: Image Analyst.
- Section 8: Network Analyst.
- Section 9: Geostatistical Analyst.
- Section 10: Artificial Intelligence.
- Section 11: Network Analyst.
- Section 12: Modeling and scripting.



Course 5: 3D Visualization and Analytics Fundamentals

Course Duration:

2 Days, 6 Hours

Course Description:

Maps, traditionally two-dimensional, are invaluable tools but have limitations in representing complex real-world features. While they serve their purpose, certain elements like wells, underground transport routes, or geological formations are better understood in three dimensions. This course delves into the realm of 3D GIS, exploring data types essential for modeling the real world accurately, including functional surfaces and various 3D feature types. ArcGIS, renowned for its GIS capabilities, unveils its modern 3D functionalities to enhance decision-making and analysis. By harnessing ArcGIS's 3D capabilities, users can delve deeper into their data, gaining invaluable context. Techniques for creating, managing, and analyzing 3D content are thoroughly explored, empowering users to leverage ArcGIS's full potential.

ArcGIS Pro revolutionizes mapping by seamlessly integrating vertical information into traditional maps, enriching them with a third dimension. Through ArcGIS Pro, users can craft photorealistic scenes for realistic depictions or cartographic scenes to convey data-driven insights. This course guides learners through the process of planning, sourcing data, and constructing compelling 3D scenes.

Course Objectives:

- Discover the advantages of visualizing GIS data in 3D.
- Explore 3D visualization techniques.
- Use ArcGIS Pro to explore data in 3D.
- Create 3D models that represent real-world locations and proposed designs.
- Author 3D scenes.
- Analyze multidimensional data by using voxel layers.
- Use voxels to visualize multidimensional data.
- Visualize reality in their real-world 3D context.
- Analyzing 3D data to explore and understand variables that involve three-dimensional space.
- Publish 3D content and apps.
- Navigate 3D scenes.
- Describe the types of data used to model real-world features and phenomena in 3D.

Course TOC:

- Section 1: Basics and 3D Data Types.
- Section 2: Design Animations Using 3D Maps.



Course 6: ArcGIS Enterprise Fundamentals

Course Duration:

2 Days, 6 Hours

Course Description:

ArcGIS Enterprise is the foundational software system for GIS, powering mapping and visualization, analytics, and data management. It is the backbone for running the Esri suite of applications and your custom applications. ArcGIS Enterprise is tightly integrated with ArcGIS Pro for mapping and authoring and seamlessly connects with ArcGIS Online to share content between systems.

Collaboration and flexibility are central to ArcGIS Enterprise, allowing you to organize and share your work on any device, anywhere, at any time. ArcGIS Enterprise gives you complete control over your deployment. It can be run on Microsoft Windows, Linux, and Kubernetes, and it supports small single-machine deployments as well as large multi-machine deployments in the following:

- Public cloud infrastructure
- Private cloud infrastructure
- On-premises infrastructure using physical or virtualized hardware

This flexibility unlocks advanced capabilities to support your organization's needs, such as tracking real-time data, performing big data analysis, raster analytics, hosting image services, and data science workflows. Your ArcGIS Enterprise deployment can also be connected or disconnected from the open internet and can be configured to prevent data loss and downtime in the event of a disaster. In this theoretical course, we will watch and learn all the basics and terminology theatrically only, without any kind of practical application.

Course Objectives:

- Publish maps, feature layers, vector tile layers, and other GIS resources to an ArcGIS Enterprise portal.
- Understand the role that ArcGIS Enterprise components play in managing and sharing GIS resources.
- Discover resources and assess their usefulness for projects.
- Manage access to shared resources and create descriptive information so that portal users can easily discover resources and assess their usefulness for their projects.
- Apply expert techniques to optimize maps and layers before publishing to ensure high performance and excellent user experience.
- Understand the role that ArcGIS Enterprise components play in managing and sharing GIS resources.

Course TOC:

- Section 1: ArcGIS Enterprise Components.
- Section 2: Technical Overview, GIS Enterprise System On-premise.



Course 7: GIS Open-Source workflow

Course Duration:

2 Days, 6 Hours

Course Description:

Are you willing to learn how to build an Enterprise GIS from scratch using Free and Open-Source Software for GIS?

In this course you will learn to map your data with open-source GIS: explore GIS tools, learn concepts and terminology of spatial analysis, learn how to analyze data, symbolize data, and make your maps, vectorial and raster data, allowing you to build a multi-user enterprise GIS from scratch using Postgres/ PostGIS (free) and QGIS (free).

Course Objectives:

- Using QGIS To Design Maps.
- Write SQL queries to retrieve and analyze spatial data.
- Integration between QGIS Desktop and PostGIS.
- Download and Install QGIS, PostgreSQL/PostGIS, and GeoServer.
- Publishing Spatial Data as Web Map Services using Geoserver.
- Storing Spatial Data in Enterprise Spatial Database (PostgreSQL / PostGIS).
- The fundamentals of QGIS.

Course TOC:

- Section 1: Introduction to GIS in Open-Source.
- Section 2: GeoSpatial Analysis with PostGIS.



Course 8: Applying GIS To Industries and Infrastructure

Course Duration:

5 Days, 20 Hours

Course Description:

Welcome to our course on Infrastructure Networks with Geographic Information Systems (GIS). In this course, we will delve into the theoretical foundations of infrastructure networks, and explore their importance, design principles, and operating mechanisms. We will also study real-world applications, with a focus on infrastructure networks. Such as electricity networks, natural gas pipelines, sewage systems, water networks, and communications networks. By combining theoretical knowledge with practical applications of GIS, this course aims to provide you with a very simple and only theoretical understanding of how infrastructure networks work and how GIS techniques can enhance their management. and analyze it.”

Course Objectives:

- Understand the basics of infrastructure networks
- Learn how to implement infrastructure network projects in GIS

Course TOC:

- Section 1: Sewer Network Fundamentals
- Section 2: Water Network Fundamentals
- Section 3: Pipeline natural GAS Network Fundamentals
- Section 4: Electricity Network Fundamentals
- Section 5: Telecom Network Fundamentals.



Course 9: Simulation of GIS Project in your Company

Course Duration:

"Participating in this stage is not a prerequisite for enrolling in the course. It is open for participation for three months to any student or employee within BeGISer company."

Course Description:

The lectures are over, but your educational journey with us does not end here. In this stage, you will learn a lot of experiences shared between members of your group and specialists who actually work in the field of GIS. You will gain practical knowledge from them by participating in an actual project using all the techniques that you have learned during the previous period.

This course has been prepared specifically for those who want an actual application on one of the projects that were implemented using GIS and under the supervision of specialized employees who have practical experience in this specialty.

Course Objectives:

- Using QGIS To Design Maps.
- By agreeing to participate in this challenge, you acknowledge and agree to the following:
- Respecting the BeGISer policy in dealing with team members.
- Contributing with the team in disseminating information and providing support to less experienced colleagues.
- Attending all meetings online or in the company.
- Committing to submitting all data and tasks assigned to it on time.

Course TOC:

"The contents of this GIS simulation are confidential and should not be shared with anyone outside of BeGISer company. Therefore, you will learn all the details while practicing the simulation within the company."



Software

- ArcGIS Pro
- ArcGIS Online
- ArcGIS Server
 - ArcGIS Server
 - Portal for ArcGIS
 - ArcGIS Data Store
 - ArcGIS web Adaptor
- AutoCAD
- Civil 3D
- Google Earth Pro
- PostgreSQL\PostGIS
- QGIS
- Helper Softwares



Instructor-Led Course

Ahmed EL Shstawy

- Technical Manager at BeGISer
- Assistant GIS Expert at General Organization for Physical Planning
- GIS Training team leader at Penta-b company.
- Senior GIS Enterprise Administrator at Telecom EGYPT company.

Eslam Ahmed

- Instructor 'of Remote Sensing' at BeGISer.
- Teacher at Helwan University Department of Geography & Geographic Information Systems.

Walid Mansour

- Instructor 'Industries - Telecom Utilities Network' at BeGISer.
- GIS Analyst at Elsewedy Electric company.

Badr-Elden Ibrahim

- Instructor 'Industries - Electricity Utilities Network' at BeGISer.
- senior GIS Analyst at Elsewedy Electric company.

Marwa Eleraki

- Instructor 'Industries' Gas Utilities Network at BeGISer.
- GIS Analyst at TAQA GAS company

Asmaa Adel

- Instructor 'Industries - Water Utilities Network' at BeGISer.
- GIS developer and spatial data analyst at BMC company.

Aya Sanad

- GIS Instructor at BeGISer.
- Civil engineer (Structural Engineer) at sarh El Benna contracting company .

