Faculty of Science

Department of Earth and Environmental Department

MSc in Applied Geoinformatics

Non-Thesis Track

A. Admission Requirements:

Students wishing to enroll in this program must satisfy the following two conditions:

1) Have a bachelor's degree in earth and environmental sciences, geography, Geographic Information Systems, geology, environment science, natural resources, geomatics engineering, civil engineering, urban planning or any other related field approved by the department.
2) Meeting the English language requirements as outlined by the decisions of the Higher Education Council.

B. Degree Requirements:

1) Meeting the conditions stipulated in the Master program regulations number (3) for the year 2011.
2) Completion of remedial courses recommended by the department graduate studies committee.
3) Studying and successfully passing at least (33) credit hours from the level of (600) and above.

Table 1. Core Courses: (24) credit hours

Course no.	Course name	No. of credit hours	Pre-requisite course	Semester offered
AGI.611	Geospatial Data Acquisition	3	-	First
AGI.612	Geodatabase Management	3	-	First
AGI.613	Big and geocrowd-sourced data	3	-	First/Second
AGI.621	Geospatial Data Analysis	3	AGI.611	Second
AGI.622	Geo-visualization	3	-	First/Second
AGI.631	Remote Sensing and Photogrammetry	3	-	First
AGI.641	Urban and Environmental Applications of Geoinformatics	3	AGI.621+ AGI.631	First/Second
AGI.661	Research Methods in Geoinformatics	3	-	First

Table 2. Elective Courses: (9) credit hours

Course no.	Course name	No. of credit hours	Pre-requisite course	Semester offered
AGI.642	Geo-application Development	3	AGI.621	First/Second
AGI.643	Web GIS and Geo-services	3	AGI.621	First/Second
AGI.644	Engineering Surveying	3	-	First/Second
AGI.662	Special Topics in Geo-informatics	3	Dept. Approval	First/Second
EES601	Environmental Systems	3	-	First/Second
EES670	Advanced Environmental Geology	3	-	First/Second
EES678	Earthquakes	3	-	First/Second

*Students must select one course only from each of the following groups:

Group 1	AGI642	AGI643	AGI644	AGI662
Group 2	EES601	EES670	EES678	

3. Passing the Comprehensive exam (AGI.698) according to Yarmouk university regulations. The Comprehensive exam accounts for zero credit hours for registration purposes.

Courses Description

Course Number:	AGI.611
Course Name:	Geospatial Data Acquisition
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course focuses on the methods of acquiring, retrieving, storing, and exploring geospatial data from various resources including ground-, aerial-, and space-based techniques. Students will confront realistic problem scenarios that incorporate skills and concepts such as definition of data needs, metadata content standards, legal and ethical issues related to data use, data formats and types, interoperability, field collection methods and contributing data for public use. The main theoretical concepts of data acquisition and integration will be provided through course notes and assigned readings. Hands-on practical exercises and assignments will give students an opportunity to internalize and apply the concepts and theory learned throughout the course.
Objectives:	The main objectives of this course are to: 1. learn the methods of collection, extraction, storage and exploration of data from different sources (ground, air and space-borne techniques). 2. identify the required data for actual case studies and assess their quality**.** 3. learn the skills and concepts required to define standards for geo-data documentation**.** 4. famelirize the students with legal and ethical issues related to the use of data 5. learn the various data formats and types and use them in different software**.**
Learning Outcomes:	After completing this course, students will be able to: 1. identify and evaluate appropriate and cost-effective data sources for specific applications. 2. design and implement a strategy for capturing or sourcing geospatial data**.** 3. critically evaluate the potential impacts of data quality on spatial analysis and decision making.

Course Number:	AGI.612
Course Name:	Geodatabase Management
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course provides an advanced background on Database Management System (DBMS) as an integral and essential part of GIS. The course presents data models, implementation and the relational, hierarchical, and network approaches to database management systems. The course covers several aspects such as geodatabase overview, architecture, design, and building.
Objectives:	The main objectives of the course are to: 1. understand the primary concepts of geodatabase. 2. learn the essential skills for designing a geodatabase. 3. utilize the power of the geodatabase to work with vector and raster data.
Learning Outcomes:	After completing this course, students will be able to: 1. recognize the importance of using databases in GIS environment. 2. develop database models for different data types. 3. demonstrate understanding and competency of spatial database systems such as architectures and query.

Course Number:	AGI.613
Course Name:	Big and geocrowd-sourced data
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course aims to familiarize students with big data as basis for addressing substantive research questions. The focus is given to the new emerging available big data coming from different in-situ geolocated sensors, different platforms such as UAV and satellites, or those obtained as products of the processing of global high-resolution data. Emphasis will also be given to crowdsourced (for instance from social media) and voluntarily contributed data (Volunteered Geographic Information). Strengths and limitations of big geodata research are discussed in depth using real-world examples and practical exercises.
Objectives:	The main objectives of this course are to learn: 1. the essential theoretical concepts of big geodata, citizen science and crowd-sourced geodata. 2. the knowledge and skills necessary to deal with big geodata (mining, manAGI.ng, analysing and visualising) . 3. the ability to deal with citizen contributed geodata.
Learning Outcomes:	After completing this course, students will be able to: 1. realize theoretical concepts of big geodata. 2. deal with big geodata and its analysis. 3. gain the required skills to deal with big geodata that raly on citizins as a source of data

Course Number:	AGI.621
Course Name:	Geospatial Data Analysis
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course focuses on implementation of spatio-temporal analyses and spatial statistics including exploratory analysis, spatial autocorrelation and spatial regression, point and areal pattern analysis, interpolation and sampling methods, model building, distance and directional analysis, geometrical processing, map algebra, surface analysis, network and locational analysis.
Objectives:	The main objectives of this course are to: 1. provide the students with the essential theoretical concepts of quantitative and geostatistical analysis. 2. train the student on applying different quantitative and geostatistical analysis methods to real-world problems.
Learning Outcomes:	After completing this course, students will be able to: 1. identify the proper quantitative and geostatistical methods for solving real-world problems. 2. apply several geo-analytical techniques for solving real-world problems.

Course Number:	AGI.622
Course Name:	Geo-visualization
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course provides students with both the conceptual understanding and practical experience needed to design effective dynamic geographic representations. The course explores issues of computer based mapping and Geo-visualization including concepts for geographic data representation, symbolization, map design, 3D visualization, and web-based mapping.
Objectives:	The main objectives of this course are to: 1. understand the theoretical concepts and methods of cartography and geo-visualization. 2. equip students with practical skills in designing and presenting maps. 3. train students on evaluating maps according to the cartography principles.
Learning Outcomes:	After completing this course, students will be able to: 1. implement advanced geo-visualization tools using industry standard software. 2. produce outstanding visual representation of geographic data using current geo-visualization tools 3. demonstrate understanding on how interactive and dynamic maps are made.

Course Number:	AGI.631
Course Name:	Remote Sensing and Photogrammetry
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	The focus is given to satellite remote sensing, airborne, drone and terrestrial photogrammetry; and airborne, terrestrial and mobile laser scanning. Optical, multispectral, hyperspectral and microwave sensors are presented. The state-of-the-art sensor technology is presented and discussed. Advanced techniques for image quality enhancement, data fusion, classification and change detection based on images and point clouds are illustrated. The data acquisition workflow using modern surveying techniques such as unmanned aerial vehicle (UAV) and laser scanner is analysed.
Objectives:	The main objectives of this course are to: 1. master the knowlage of the student with remote sensing data types and spectrum. 2. train the students on working with advanced methods of remote sensing image processing. 3. train the students on preparing a workplan to deal with various modern surveying devices including drones and 3D laser scanners.
Learning Outcomes:	After completing this course, students will be able to: 1. work with various remote sensing data types and spectrum. 2. deal with advanced methods of remote sensing-based image processing techniques. 3. prepare a workplan to deal with various advanced serveying devices including drones and 3D laser scanners.

Course Number:	AGI.641
Course Name:	Urban and Environmental Applications of Geoinformatics
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course will give students a fundamental understanding of how geoinformatics is currently used in urban and environmental sciences. The course focuses on the application of geoinformatics by integrating theory and application of spatial analysis to solving real-world urban and environmental problems in specific topics such as: air pollution, climate change, biodiversity, soil management, natural hazards, water resources, vegetation and forestry, land use and land cover, urban landscapes, urban growth modeling, and population estimates. Students will read and critically evaluate current literature on these topics and have the opportunity to conduct their own independent research on case studies relevant to the course topics.
Objectives:	The main objectives of this course are to: 1. teach students the fundamentals of geoinformatics in urban and environmental applications. 2. train students on urban and environmental applications. 3. implement a project in one of urban and environmental applications
Learning Outcomes:	After completing this course, students will be able to: 1. apply the knowledge and techniques required for solving urban and environmental problems. 2. demonstrate understanding of how to collect geospatial data for comprehensive urban and environmental studies. 3. use geoinformatics in solving urban and environmental problems through execution of a term project and presenting it both orally and in written form**.**

Course Number:	AGI.642
Course Name:	Geo-application Development
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	The course teaches the basic concepts of programming using selected programming language such as Python for solving problem related to geospatial information. this course includes practical lab with exercises aiming at developing programming skills and applying those skills to various geospatial and environmental problems.
Objectives:	The main objectives of this course are to: 1. provide students with the knowledge and skills necessary to program using selected programming language. 2. equip the students with the knowledge and skills necessary to design and implement solutions in selected programming language to automate geoprocessing tasks. 3. learn methods, and approaches such as documentation and debugging.
Learning Outcomes:	After completing this course, students will be able to: 1. explain basic programming terms and concepts. 2. write programming codes to perform specific tasks within geoinformatics. 3. identify requirements of data, programming tools and functions, according to specific application tasks. 4. access programs and scripts available from various sources and embody them within geoinformatics application to be built-upon.

Course Number:	AGI.643
Course Name:	Web GIS and Geo-services
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course focuses on the basics of web-GIS system architecture, geospatial web services, and mash-ups. It introduces the key elements of mobile GIS solutions, the functionality of geo-portals and web technologies, web mapping interoperability utilizing universal data standards, and new concepts in CyberGIS.
Objectives:	The main objectives of this course are to: 1. provide students with a comprehensive and up-to-date overview of Web-GIS. 2. teach students the broad and real-world applications of Web-GIS. 3. differentiate between Web-GIS, geospatial web services, mash-ups, mobile GIS solutions, and geo-portals.
Learning Outcomes:	After completing this course, students will be able to: 1. deal with the technology related to Web GIS services 2. follow up with the up-to-date services in Web GIS 3. differentiate between the variuos Web-GIS services and their usage 4. apply web GIS to theoretical and practical cases.

Course Number:	AGI.644
Course Name:	Engineering Surveying
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course aims at giving students some surveying skills to support planning, operating, and processing of high-precision surveying measurements. Students are provided with methods and practical training on instruments for surveying and monitoring, including levelling, total station, GNSS and terrestrial laser scanning. Applications will include mapping of natural and man-made features, stakeout, and deformation monitoring infrastructures and geological hazards (e.g., landslide, faults movements etc.).
Objectives:	The main objectives of this course are to: 1. provide students a clear idea of basics and principles of surveying. 2. train students on using various surveying devices for terrain measurements, contouring, stakeout, and positioning. 3. give student the required skills for performing mathematical surveying calculations. 4. train the students on using various surveying devices for deformation monitoring in infrastructures, geological hazards and others.
Learning Outcomes:	After completing this course, students will be able to: 1. use surveying instruments such as levelling, total station, GNSS and terrestrial laser scanning. 2. stakeout man-made and natural features. 3. implement surveying calculations. 4. design altimetric and 3D surveying and GNSS networks. 5. apply knowledge for deformation monitoring and change detection. 6. presnt and dispaly data using appropriate methods.

Course Number:	AGI.661
Course Name:	Research Methods in Geoinformatics
Credit Hours:	3 credits (3 hours theory)
Course Description:	This course is designed to offer students concepts and instruments necessary to enhance their communication skills in public speaking, written communication (special emphasis on report and project proposals), and digital communication to facilitate their future career in geoinformatics**.**
Objectives:	The main objectives of this course are to: 1. famelirize students with communication skills in general 2. improve students' writing skills, research proposals and CV. 3. enhance students' skills of giving lectures to an audience. 4. train students on electronic communication skills.
Learning Outcomes:	After completing this course, students will be able to: 1. Demonstrate research methodologies proficiency by acquiring skills to evaluate, select, and apply research methods effectively. 2. Effectively apply communication skills by developing clear and structured writing for research proposals, reports, CVs, resumes, and cover letters. 3. Abide by ethical research and professional conduct through understanding and applying ethical principles in research and professional contexts.

Course Number:	AGI.662
Course Name:	Special Topics in Geo-informatics
Credit Hours:	3 credits (2 hours theory and 1 hour practical)
Course Description:	This course fouceses on advanced knowledge and practical skills not gained in the other courses e.g. 3D analysis, spatial modeling,multiple regression, principal components analysis , clustering methods, and time series analysis. The course has also a lab component where students practice applying the analysis methods using a geoinformatics software.
Objectives:	The main objectives of this course are to: 1. teach students the knowledge required for advanced geospatial topics. 2. give the students the practical skills of various topics such as 3D analysis, spatial modeling, multiple regression, principal component analysis, clustering methods, and time series analysis.
Learning Outcomes:	At the end of this course, students will be able to: 1. explore new areas of geoinformatics. 2. learn advanced knowledge of geoinformatics.

Course Number:	EES601
Course Name:	Environmental Systems
Credit Hours:	3 credits (3 hours theory)
Course Description:	This course introduces students into the environmental systems and its components and characteristics. It also give students problems of environmental systems, ecological succession and cycles of main elements. The course focuses on the impact of human activities and its mitigation.
Learning Outcomes:	At the end of this course, students will be able to: 1. Recognize the basics of environmental science 2. Identify environmental problems 3. Identify ecological succession 4. Understand the theories of life origin and human development 5. Understand the Biogeochemical cycles and human impact on the environment and mitigation 6. Distinguish between human and natural systems

Course Number:	EES670
Course Name:	Advanced Environmental Geology
Credit Hours:	3 credits (3 hours theory)
Course Description:	This course focuses on the fundamentals of physical geology (rock types, mineral identification, plate tectonics, etc.), with an emphasis on human interaction with their environment. We will explore natural processes and anthropogenic (human-impacted) effects on those processes in the context of natural hazards, natural resources and sustainability.
Learning Outcomes:	At the end of this course, students will be able to: 1. Explain the dynamic behavior of the Earth as a complex system. 2. Discuss issues related to human population growth and its impact on the natural world. 3. Describe the interactions between tectonic plates and volcanic eruptions and earthquakes. 4. Explain the ways that people contribute to and mitigate damage as a result of natural disasters like tsunamis, landslides, and flooding. 5. Discuss evidence of global climate change and possible impacts of anthropogenic warming. 6. Describe appropriate locations for waste disposal. 7. Explain the causes of soil, air and water pollution

Course Number:	EES678
Course Name:	Earthquakes
Credit Hours:	3 credits (3 hours theory)
Course Description:	The course is designed to offer students deep knowledge on the mechanics of earthquakes and seismic waves. The course introduces students into earthquakes hazard and risk assessment the methods of interpreting seismic data.
Learning Outcomes:	At the end of this course, students will be able to: 1. Understand the mechanics of earthquakes. 2. Determine the locations of earthquakes. 3. Assess the harardaa nd risk of earthquakes. 4. Recognize the seismic activites in the Middle East adn Jordan. 5. Interpret seismic data.