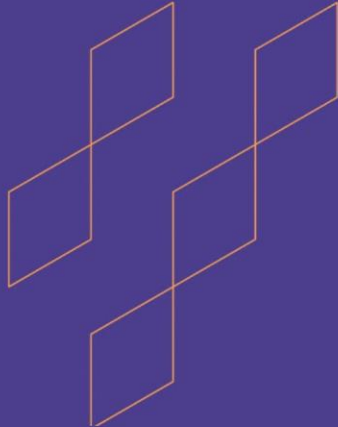




Course Specification

(Postgraduate Programs)

Course Title: **Drones in Geospatial Data**

Course Code: **IS5000**

Program: **Diploma in Geographical Information Systems**

Department: **Software Engineering**

College: **Computing**

Institution: **Umm Al Qura University**

Version: **V0.1**

Last Revision Date: **7 December 2024**

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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track

B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: :(Level 2/First year)

4. Course General Description:

This course offers an introduction to using drones for geospatial data collection, with topics including drone hardware and software, and data collection and processing. It also introduces Geographic Information Systems (GIS) tools that used for spatial data analysis, management, and visualization. Additionally, the course covers the ethical and regulatory issues involved in using drones for geospatial data collection.

5. Pre-requirements for this course (if any):

N/A

6. Pre-requirements for this course (if any):

N/A

7. Course Main Objective(s):

The main objective of this course is to learn the students the principles of using drones to collect geospatial data, the concept of geospatial data of GIS. Moreover, the students learn how to collect, manage, process, and analyze drone-collected geospatial data.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	55	75%
2	E-learning	20	25%
3	Hybrid - Traditional classroom - E-learning		
4	Distance learning		



3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	45
3.	Field	
4.	Tutorial	
5.	Others (specify).....	
	Total	75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the use of drones for geospatial data collection and related issues.	K1	Lectures Labs Mind maps Concepts map	Quizzes Online Quizzes Midterm Lab Exam Final Exam
1.2	Describe the concepts and theories of drone-collected geospatial data and their applications	K1		
1.3	Display a comprehensive understanding of drone-collected geospatial data collection, processing, and analysis.	K2		
2.0	Skills			
2.1	Handle collecting geospatial data using drone.	S1	Lectures Problem sets Project Flipped Classroom Self-learning	Quizzes Midterm, Lab Exam Final Exam Project evaluation
2.2	Design and construct the process, analyze, and visualize spatial data using different geospatial analyst tools.	S1		
2.3	Design and manage geospatial projects.	S3		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Function effectively as a member or leader of a team engaged in activities to develop knowledge and to collect, process, and analyze geospatial drone-collected geospatial data and GIS.	V1	Project Lab Project presentation	Project evaluation Lab exam Project presentation evaluation
3.2	Personal competence to apply analytical and evaluative tools to GIS mapping for real-world applications.	V2		

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to drones and geospatial data - History of drone technology - Applications in geospatial data	5
2.	Drone hardware and software - Types of drones and their capabilities - Remote sensing instruments and payloads - Administration regulations - Ethical considerations of drone use	10
3.	Geographic Information Systems (GIS) - Applications of GIS in different fields - GIS software and hardware	10
4.	Spatial data types and formats - Raster and vector data models - Coordinate systems and projections	10
5.	Data collection, management, and geodatabases with drones - Planning a drone mission - Flight operations and data acquisition - GPS and remote sensing - Field data collection techniques - Data structure and organization - Creating and managing geodatabases	10
6.	Data processing techniques	10



	- Processing drone imagery - Spatial queries and selection - Geoprocessing and analysis tools	
7.	Data analysis and visualization of drone-collected geospatial data - GIS analysis and mapping - Data visualization	10
8.	Case studies of drone applications in geospatial data - Agriculture and crop monitoring - Construction site mapping and monitoring - Disaster response and assessment	10
Total		75

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	3,6,9,12	10%
2.	Midterm	6	20%
3.	Project	10	20%
4.	Final exam	Exam week	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Amy E. Frazier, Kunwar K. Singh. Fundamentals of Capturing and Processing Drone Imagery and Data. 1 st edition. 2021
Supportive References	Bonny McClain. Python for Geospatial Data Analysis: Theory, Tools, and Practice for Location Intelligence 1st Edition. 2022
Electronic Materials	Umm Al Qura blackboard system containing teaching resources (Slides, assignment papers, etc.)
Other Learning Materials	Lab on computer systems

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- A Lecture room appropriate for maximum 25 students with a personal computer, a data show and a smart board. - A Lab room appropriate for maximum 15 students with a personal computer, a data show and a smart board.





Items	Resources
Technology equipment (Projector, smart board, software)	Labs with powerful computers (software development computers): - Processor - dual core 2.4 GHz+ (i5 or i7 series Intel processor or equivalent AMD) - RAM - 8 GB - Monitor > 18" widescreen LCD - Operating System - Windows 7 minimum Software: - Photogrammetry software: to create 3D models and maps from drone imagery (Pix4Dmapper, Agisoft Metashape, or RealityCapture). - Geographic Information Systems (GIS) software (ArcGIS, QGIS, and GRASS GIS). - Data processing software (CloudCompare, MeshLab, or Global Mapper). - Programming software (Python).
Other equipment (Depending on the nature of the specialty)	Drones

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Anonymous surveys
Effectiveness of students' assessment	Peers	Peer review
Quality of learning resources	Instructor	Self-review report
The extent to which CLOs have been achieved	Instructor	Self-review report
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	07/12/2024

