



Course Specification

— (Bachelor)

Course Title: **Environmental GIS Applications**

Course Code: GETO4518

Program: **Environmental Sciences**

Department: **Biology**

College: **Faculty of Sciences**

Institution: **Umm Al-Qura University**

Version: **1**

Last Revision Date: **29/12/2024**



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A. General information about the course:

1. Course Identification

1. Credit hours: (2h/ Week)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track Others

B. ☒ Required ☐ Elective

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

4. Course general Description:

Effective environmental planning requires knowledge regarding Geographic Information Systems (GIS) technology. Understanding how everything is running is the first step for managing and protecting the natural environment. This course shows the importance of the use of GIS in the environmental fields. It covers subjects such as disaster management, estimation of flood damage, land use and land cover changes, management of natural resources and more. The ability of GIS for monitoring, analyzing, and modeling environmental issues and the interaction between human and natural environment are explored in the course.

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

Principle of Ecology (BIOE1502)

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

NA

7. Course Main Objective(s):

This course aims at giving the student knowledge in the fields:

- 1) Taking into account the stages of the geographic information system.
- 2) Explains the concept and components of geographic information systems.
- 3) Know the terms called geographic information systems.
- 4) Enumerates analysis tools and their importance.
- 5) Uses geographic information systems software.
- 6) Create information layers.
- 7) Draw maps using geographic information systems programs.



2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	-	-
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	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
Total		30

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define the concept of GIS in the environmental field.	K1	Lectures, class assignments	Quizzes, individual assessment, written exams
1.2	Understand the recent techniques of remote sensing and GIS in the environmental applications	K2	Lectures, class assignments	Quizzes, Written exams
2.0	Skills			





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Monitor the environmental changes using satellite images.	S1	Lectures, class assignments	Group work, quizzes assignments
2.2	Apply geographic information system for environmental conservation	S2	Lectures, class assignments	Assignments Group work, Written exams
2.3	Assess the natural hazards and the ability to model the disasters using GIS.	S3	Practical classes	Assignments Group work
2.4	Incorporate different geospatial data to manage the natural resources using GIS	S3	Practical classes	Practical Assignments Group work
3.0	Values, autonomy, and responsibility			
3.1	Work with multi-disciplinary teams to communicate effectively both in written and oral forms.	V1	Discussions, Group presentations	Practical Assignments Written Exams
3.2	Evaluate the use information technology related to the field.	V2	Discussions, Group presentations	Practical Assignments Written Exams

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction: Introduction to Geographic Information and GIS.	2
2.	GIS and Environment: Theory and concepts.	2
3.	Data Models: Data models, map basics, vector data – point, line and area.	2
3.	GIS field work in the environmental fields: GPS and mobile GIS.	2
4.	GIS components and data types and structure.	2



5.	Remote sensing components and data types.	2
6.	The use of GIS for natural disaster.	2
7.	Land use and land cover change.	2
8.	The use of GIS for estimation of flood damage.	2
9.	The use of GIS for management of natural resources.	2
10.	Building a GIS structure for Environmental Impact Assessment (EIA).	2
11.	Global Navigation Satellite Systems: Map transformations, GPS.	2
12.	Aerial and Satellite Images, Digital Data Sources: Photos and satellite images digital data.	2
13.	Tables and Relational Databases: Relations databases, table manipulation.	2
14.	Basic Spatial Analysis: Logic Operations, General Arithmetic Operations, General Statistical Operations, Geometric operations.	2
15.	Revision.	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Periodical Exam(s)	3-7	15 %
2.	Mid Term Exam (Theoretic)	6	20 %
3.	Reports and essay	9	15 %
4.	Oral presentation	13	10%
5.	Final Examination	16	40 %
	Total		100%

*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

- Aziz, Muhammad Al-Khuzama, 2002, Geographic Information Systems - Basics and Applications for Geographers, Al-Ma'arif Establishment, Alexandria.
- Al-Qarni, Abdullah Muhammad, 1427 AH, Geographic Information Systems - Basic Principles and Operational Concepts, Specifications, Standards, Design and Spatial Analysis, First Edition, Publisher: Author, Riyadh.



	Bolstad, P. (2019) GIS Fundamentals: A First Text on Geographic Information Systems, 6 th edition, XanEdu, USA.
Supportive References	- Demers, Michael, Modeling in Geographic Information Systems with the Cellular Model, 1432 AH, translated book, 2002 AD, translated by: Al-Ghamdi, Ali Maadah Al-Ghamdi, King Saud University, Riyadh. - The ESRI Guide to GIS Analysis, Volume 1: Geographic Patterns & Relationships. ESRI Press. (Mitchell, Andy, 1999). - The ESRI Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics. ESRI Press. (Mitchell, Andy 2005) - GIS Tutorial 2: Spatial Analysis Workbook, 10.1 edition, ESRI Press, 2013
Electronic Materials	http://www.innovativegis.com/basis/MapAnalysis/ http://www.esri.com/what-is-gis/learn-gis http://ocw.mit.edu/courses/urban-studies-and-planning/11-521-spatial-database-management-and-advanced-geographic-information-systems-spring-2003/index.htm
Other Learning Materials	---

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, websites, and blackboards
Technology equipment (projector, smart board, software)	Projector, smart board, software, and blackboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader	Direct
Effectiveness of	Faculty and Program Leaders	Direct



Assessment Areas/Issues	Assessor	Assessment Methods
Students assessment		
Quality of learning resources	Students and Faculty members	Direct
The extent to which CLOs have been achieved	Faculty and Program Leaders	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	