



Course Specification of Geographical Information Systems (GIS)

Course No (.....)

2020/2021

Head of Department	Vise Dean for Qulity Assurance	Dean of the Faculty	Dean of Development center and Quality Assurance
Assoc. Prof. Mansour N. Ali	Dr. Anwar Al-Shamiri	Dr. Nagi Al-Shibani	Assoc. Prof. Dr.Huda Al.Emad
Rector of Sana'a University			
Prof. Dr. Qassim Mohammed Abbas			



Course Specification of Geographical Information Systems

I. Course Identification and General Information:						
1	Course Title:	Geographical Information Systems (GIS)				
2	Course Code & Number:					
2	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	--	2	--	3
4	Study level/ semester at which this course is offered:	Third Year -First Semester				
5	Pre –requisite (if any):	database systems				
6	Co –requisite (if any):	None				
7	Program (s) in which the course is offered:	Computer Science, Information Technology, Information Systems				
8	Language of teaching the course:	English				
9	Study System	Term Based System				
10	Mode of delivery:	Full Time				

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Rector of Sana'a University Prof. Dr. Qassim Mohammed Abbas			



11	Location of teaching the course:	Faculty of Computer and Information Technology
12	Prepared By:	Dr. Malek Al-gabri
13	Date of Approval	

II. Course Description:

An overview of geographic information systems and a foundation in georeferencing spatial data with coordinate systems, projecting these data to a flat surface, employing map scale, working with layers of information, and making maps. Issues in scale and map projection transformations and in coordinated systems conversions. This course examines building and understanding maps in digital formats.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Explain the concepts and terms of geographical information systems.	A1,A2,A3,A5
a.2	Describe geographic information systems components, models and applications.	A1,A2,A3,A5
b.1	Analyzing geo-data qualitatively and/or quantitatively and visualizing spatial data.	B1,B2,B3,B4

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b.2	Explore the geographic information systems tools, techniques and model's analysis to address geospatial problems.	B1,B2,B3,B4
c.1	Choose a design to satisfy a given problem requirements using geographic information systems techniques.	C2,C3,C4,C6
c.2	Develop communication skills in conveying objectives and ideas concerning the production produced by geographic information systems.	C2,C3,C4,C6
d.1	Discuss effectively the applications of GIS in a variety of fields.	D1, D2, D3, D4
d.2	Work in a team, lead teams in different professional tracks, and communicate efficiently by different means.	D1, D2, D3, D4

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Explain the concepts and terms of geographical information systems.	Lectures problem solving	Examinations Assignments
a2- Describe geographic information systems components, models and applications.	Lectures problem solving	Examinations Assignments

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(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Analyzing geo-data qualitatively and/or qualitatively and visualizing spatial data.	Lectures problem solving in-class Exercises case study	Assignments Case study reports Presentations examinations
b2- Explore the geographic information systems tools, techniques and model's analysis to address geospatial problems.	Lectures problem solving in-class Exercises case study	Assignments Case study reports Presentations examinations

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Choose a design to satisfy a given problem requirements using geographic information systems techniques.	Lectures in-class Exercises	Assignments, case study reports, and examinations.
c2- Develop communication skills in conveying objectives and ideas concerning the production produced by geographic information systems..	Lectures in-class Exercises	Assignments, case study reports, and examinations.

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(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Discuss effectively the applications of GIS in a variety of fields.	Class Discussions Supporting Lectures	Presentations Assignments
d2- Work in a team, lead teams in different professional tracks, and communicate efficiently by different means.	Class Discussions Supporting Lectures	Presentations Assignments

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction	a1,a2	<ul style="list-style-type: none"> The nature of GIS Defining GIS Data Capture and preparation 	1	2
2	Data Models	a1,a2,b2,c1,d1	<ul style="list-style-type: none"> Introduction Common Spatial Data Models 	2	4

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			<ul style="list-style-type: none"> Vector Data Models Raster Data Models Other Data Models Data and File Structures		
3	Geodesy, Datums, Map Projections and Coordinate Systems	a1, a2, b1, b2, c1, d1	<ul style="list-style-type: none"> Introduction Map Projections and Coordinate Systems 	1	2
4	Maps, Data Entry, Editing, and Output	a2, b2, c1, d1, d2	<ul style="list-style-type: none"> Building a GIS Database Digitizing: Coordinate Capture Coordinate Transformation Output: Maps, Digital Data, Metadata	1	2
5	Global Navigation Satellite Systems and Coordinate Surveying	a2, b1, c1, d1, d2	<ul style="list-style-type: none"> Introduction Differential Correction Optical and Laser Coordinate Surveying GNSS Applications	2	4
6	Tables	a2, b2, c1, d1, d2	<ul style="list-style-type: none"> Introduction Selection Based on Attributes Joining (or Relating) Tables 	1	2

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			Normal Forms in Relational Databases		
7	Basic Spatial Analysis	a2, b1,c1,d1,d2	<ul style="list-style-type: none"> Introduction Selection and Classification Dissolve Proximity Functions and Buffering Overlay Network Analysis 	1	2
8	Topics in Raster Analysis	a2, b1,b2,c1,d1,d2	<ul style="list-style-type: none"> Introduction Map Algebra Local Functions Neighborhood, Zonal, and Global Functions 	1	2
9	Spatial Estimation: Interpolation, Prediction, Core Area	a2, b1,c1,d1,d2	<ul style="list-style-type: none"> Introduction Sampling Spatial Interpolation Methods Spatial Prediction Core Area Mapping 	2	4
10	Spatial Models and Modeling	a2, b2,c1,d1,d2	<ul style="list-style-type: none"> Introduction Cartographic Modeling 	1	2
11	Data Standards, Data Quality	b2,c1,d1,d2	<ul style="list-style-type: none"> Introduction Data Accuracy 	1	2
Number of Weeks /and Units Per Semester				14	28

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B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	<ul style="list-style-type: none"> - Setup GIS 10.1. - ArcGIS ESRI. www.esri.com - Introduction to GIS. - Show pervious projects - Show Meta data in GIS. 	1	2	a1,a2
2	<ul style="list-style-type: none"> - Create arc catalog folder - Insert shapes file - Connect to Arc map. - Open Arc map. - Insert files - Insert date 	1	2	a1,a2,b2,c1,d1
3	<ul style="list-style-type: none"> - Start editing - Determine point, polyline and polygon. 	1	2	a1,a2,b1,b2,c1,d1
4	<ul style="list-style-type: none"> - Determine Grenache line - Link attributes to object in geographic representation. - Open attribute table - Add filed in tables. 	1	2	a2, b2,c1, d1,d2
5	<ul style="list-style-type: none"> - Show label features. - Change label features. - Add symbology. - Make graph for your map. 	1	2	a2, b1,c1,d1,d2
6	<ul style="list-style-type: none"> - Create map layout - Map title - Map legend - Map north arrow - Dynamic text 	1	2	a2, b2,c1,d1,d2

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	- Scale bar making - Learn how to calculate distance on reality			
7	- Create map report - Simple report - Conditional report	1	2	a1,a2, b1,b2,d1,d2
8	- Discussion of Assignments - Quiz.	1	2	a2, b1,c1,d1,d2
9	- Exploring and downloading online GIS data	1	2	a2, b1,b2,c1,d1,d2
10	- Querying and managing spatial and attribute data	1	2	a2, b1,c1,d1,d2
11	- Editing spatial data and adding attributes	1	2	a2, b2,c1,d1,d2
12	- Designing your country map	1	2	b2,c1,d1,d2
13	- Digitizing method	1	2	a1,a2, b1,b2,d1,d2
14	- Heads-up digitizing from DOQ	1	2	a1,a2
15	- GeoProcessing	1	2	a1,a2,b2,c1,d1
16	- Practice Exam	1	2	a1,a2,b1,b2,c1,d1
Number of Weeks /and Units Per Semester 16			32	

V. Teaching strategies of the course:

Lectures
supporting lectures
In-Class Exercises
Class Discussions

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problem solving

case study

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignment	a1,a2,b1,b2,c1,d2	weekly	5
2	Class/Home Exercises	a1,a2,b1,b2,c1,d2	weekly	5
3	Presentations	b1,b2,d1, d2	6 th , 10 th , 12 th	5
4	Case study reports	b1,b2, c1,d2	6 th , 13 th	5
5	Total			20

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	weekly	20		a1,a2,b1,b2,c1, d1,d2

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2	Mid-term Exam	9 th	20		a1,a2, b1,b2,d1,d2
3	Final Exam	16 th	60		a1,a2,b1,b2,d1,d2
4	Total	100	100%		

VIII. Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. Paul Bolstad, 2016, GIS Fundamentals: A First Text on Geographic Information Systems, 5th Edition, XanEdu Publishing Inc, United State.

2- Essential References.

- 1- Michael Law, Amy Collins, 2015, Getting to Know ArcGIS, 4th Edition, Esri Press, United State.
- 2- Kang-tsung, 2015, Introduction to Geographic Information Systems, 8th Edition, McGraw-Hill Education, India

3- Electronic Materials and Web Sites etc.

- 1- <https://www.gislounge.com/tutorials-in-gis/>
- 2- <https://learn.arcgis.com/en/>

IX. Course Policies:

Unless otherwise stated, the normal course administration policies and rules of the Faculty of Computer and Information Technology apply. For the policy, see: -----

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The University Regulations on academic misconduct will be strictly enforced. Please refer to -----

1

Class Attendance:

A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic

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2	Tardy: For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he will be considered as absent.
3	Exam Attendance/Punctuality: A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4	Assignments & Project The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5	Cheating: For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	Plagiarism: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7	Other policies: <ul style="list-style-type: none"> - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments may be given directly to students using soft or hard copy

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Faculty of Computer & Information Technology

Department of Information System

Program of Information System

Course syllabus of Geographical Information Systems (GIS)

Course No (.....)

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2020/2021

Template for Course Plan (Syllabus) Geographical Information

Systems

I. - Information about Faculty Member Responsible for the Course:							
Name of Faculty Member		Office Hours					
Location & Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail							

II. Course Identification and General Information:					
1-	Course Title:	Geographical Information Systems (GIS)			
2-	Course Number & Code:				
3-	Credit hours:	C.H			
		Th.	Seminar	Pr.	F. Tr.
		٢	--	2	--
		Total			
		3			



4-	Study level/year at which this course is offered:	
5-	Pre –requisite (if any):	Basic knowledge of database management systems
6-	Co –requisite (if any):	None
7-	Program (s) in which the course is offered	Computer Science, Information Technology, Information Systems
8-	Language of teaching the course:	English
9-	System of Study:	Term Based System
10-	Mode of delivery:	Full Time
11-	Location of teaching the course:	Faculty of Computer & Information Technology

III. Course Description:

An overview of geographic information systems and a foundation in georeferenced spatial data with coordinate systems, projecting these data to a flat surface, employing map scale, working with layers of information, and making maps. Issues in scale, map projection transformations and in coordinated systems conversions. This course examines building and understanding maps in digital formats.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

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1. Explain the concepts and terms of geographical information systems.
2. Describe geographic information systems components, models and applications.
3. Analyzing geo-data qualitatively and/or quantitatively and visualizing spatial data.
4. Explore the geographic information systems tools, techniques and model's analysis to address geospatial problems.
5. Choose a design to satisfy a given problem requirements using geographic information systems techniques.
6. Develop communication skills in conveying objectives and ideas concerning the production produced by geographic information systems.
7. Discuss effectively the applications of GIS in a variety of fields.
8. Work in a team, lead teams in different professional tracks, and communicate efficiently by different means.

V. Course Content:

- Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Topics List	Week Due	Contact Hours
1	Introduction	1 st	2
2	Data Models	2 nd	4
3	Geodesy, Datums, Map Projections and Coordinate Systems	4 th	2
4	Maps, Data Entry, Editing, and Output	5 th	2
5	Global Navigation Satellite Systems and Coordinate Surveying	6 th	4
6	Tables	8 th	2

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7	Mid-term Exam	9 th	2
8	Basic Spatial Analysis	10 th	2
9	Topics in Raster Analysis	11 th	2
10	Spatial Estimation: Interpolation, Prediction, Core Area	12 th	4
11	Spatial Models and Modeling	14 th	2
12	Data Standards, Data Quality	15 th	2
13	Final exam	16 th	2
Number of Weeks /and Units Per Semester		16	32

B – Practical Aspect: (if any)			
Order	Topics List	Week Due	Contact Hours
1	<ul style="list-style-type: none"> - Setup GIS 10.1. - ArcGIS ESRI. www.esri.com - Introduction to GIS. - Show pervious projects Show Meta data in GIS.	1	2
2	<ul style="list-style-type: none"> - Create arc catalog folder - Insert shapes file - Connect to Arc map. - Open Arc map. 	1	2

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	- Insert files Insert date		
3	- Start editing Determine point, polyline and polygon.	1	2
4	- Determine Grenache line - Link attributes to object in geographic representation. - Open attribute table Add filed in tables.	1	2
5	- Show label features. - Change label features. - Add symbology. Make graph for your map.	1	2
6	- Create map layout - Map title - Map legend - Map north arrow - Dynamic text - Scale bar making Learn how to calculate distance on reality	1	2
7	- Create map report - Simple report Conditional report	1	2
8	- Discussion of Assignments Quiz.	1	2
9	Exploring and downloading online GIS data	1	2
10	Querying and managing spatial and attribute data	1	2
11	Editing spatial data and adding attributes	1	2
12	Designing your country map	1	2

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13	Digitizing method	1	2
14	Heads-up digitizing from DOQ	1	2
15	GeoProcessing	1	2
16	Practice Exam	1	2
Number of Weeks /and Units Per Semester		16	32

VI. Teaching strategies of the course:

Lectures
supporting lectures
In-Class Exercises
Class Discussions
problem solving
case study

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignment	a1,a2,b1,b2,c1,d2	weekly	5
2	Class/Home Exercises	a1,a2,b1,b2,c1,d2	weekly	5
3	Presentations	b1,b2,d1, d2	6 th , 10 th , 12 th	5
4	Case study reports	b1,b2, c1,d2	6 th , 13 th	5

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5	Total			20
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VIII. Schedule of Assessment Tasks for Students During the Semester:				
Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	Assignments	weekly	20	
2	Mid-term Exam	9 th	20	
3	Final Exam	16 th	60	
4	Total	100	100%	

IX. Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
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2- Essential References.	
1. Michael Law, Amy Collins, 2015, Getting to Know ArcGIS, 4 th Edition, Esri P United State. 2. Kang-tsung, 2015, Introduction to Geographic Information Systems, 8th Edition McGraw-Hill Education, India	
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1. <https://www.gislounge.com/tutorials-in-gis/>
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X. Course Policies:

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2	Tardy: For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he will be considered as absent.
3	Exam Attendance/Punctuality: A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4	Assignments & Project The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
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	<ul style="list-style-type: none"> - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments my given directly to students using soft or hard copy
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اللجنة الإشرافية			
م.	الاسم	الصفة	التوقيع
١	أ.م.د. عبد الماجد الخليدي	نائب عميد الكلية للشؤون الأكاديمية	
٢	أ.م.د. احمد مجاهد	نائب عميد مركز التطوير الأكاديمي وضمان الجودة	
٣	د. حسين الأشول	ممثل المركز في الكلية	
٤	أ.د. إبراهيم المطاع	نائب رئيس الجامعة للشؤون الأكاديمية	

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<p style="text-align: right;">Rector of Sana'a University Prof. Dr. Qassim Mohammed Abbas</p>			