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**Department of Earth Sciences and Petroleum**

**College of Science**

**University of Salahaddin-Erbil**

**Subject: Practical Applied GIS**

**Course Book 3rd year Department of Earth Sciences and Petroleum**

**Lecturer's name M.Sc. Kaiwan K. Fatah**

**PhD student in Applied GIS and Remote Sensing**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **Practical Applied GIS** |
| **2. Lecturer in charge** | **Kaiwan Kareemkhan Fatah** |
| **3. Department/ College** | **Geology/ Science** |
| **4. Contact** | **e-mail: kaiwan.fatah@su.edu.krd** **k1geors@gmail.com****Tel: 07504096074** |
| **5. Time (in hours) per week**  | **For example Theory: 1** **Practical: 2**  |
| **6. Office hours** | **9am-3pm**  |
| **7. Course code** |  |
| **8. Teacher's academic profile**  |  **B.Sc. Salahaddin university-Erbil college of Science Dep. Of Geology 2011 Erbil -Iraq** **M. Sc. Southampton University faculty of Sciences 2015 Southampton- UK** **General specialization Geology****Specific specialization Applied GIS and Remote Sensing****PhD student**  |
| **9. Keywords** | **Remote Sensing, Geology, Environmental Science and ENVI**  |
| **10. Course overview:** The course will cover the basic of the GIS and its application in various aspects, for example, using GIS in geology, environmental Sciences and hydrology. The course will apply ArcGIS software for studying geological and environmental sciences...etc. It also to teach students to be familiar and how to use the ArcGIS software and deal with some basic tools, and how to deal with different type of digital geospatial data.GIS is a powerful tool, and this course is meant to introduce students to the basics. Because GIS can be applied to many research fields, this class is meant to give students an understanding of Its possibilities along with the capabilities to begin engaging those possibilities. The course seeks to provide students with a basic level of familiarity with several aspects of Geographic Information Systems and Geographic Information Science, such that the range of possibilities for GIS-based work is understood and an adequate foundation for engaging those possibilities is laid. The class will focus on teaching through practical example. |
| **11. Course objective:**This course is for students who have no previous experience in GIS, aiming to introduce students to the fundamentals of GIS by providing the theory and hands-on experience with real data and using GIS software. To determine the fundamental geology and environmental Sciences and environmental geology by using GIS software and digital data. This course provides basic-level knowledge of Geographic Information System (GIS) principles, techniques and practice in geology, environmental and water resources engineering and natural resources management. In this course students will learn about data sources, visualization, query, analysis, and integration using “ArcGIS 10.x” which is a popular desktop GIS and mapping software.Thus, the objectives for the course are:* Providing an understanding of basic skills necessary to work with GIS, predominantly using ESRI’s ArcGIS software
* Introducing students to software and techniques beyond ESRI products
* Teaching spatial data visualization techniques along with introductory knowledge of effective cartography and additional software for the production of maps and other information graphics
* Teaching skills needed to develop and execute a project requiring GIS as a management, analytical, and/or visualization tool
* Identifying and accessing publicly available data sets
* Teaching the skills necessary to create GIS data through a variety of methods including those offered by global positioning system (GPS) technologies
* Providing an introductory understanding
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| **12. Student's obligation** The student should attend all labs; prepare each lab report and submitting assignments in **the time.**  |
| **13. Forms of teaching**Different forms of teaching will be used to reach the objectives of the course: PDF document or power point presentations for the head titles and definitions and typical data, and the main teaching object: using some basic tools of ArcGIS software to analysis data and satellite images and Appling in different fields.  |
| **14. Assessment scheme**The students are required to do two closed book practical exam at the mid and end of the semester. The exams have 5.0 marks and the average of these exams is obtained, the attendance, classroom activities and weekly report 2.5 marks. There will be a final practical exam on 7.5 marks. So that the final grade will be based upon the following criteria:Mid-semester Practical exam: 6.5%Average of them 13%+ End-semester Practical exam: 6.5%  Laboratory participation and weekly report 5% Assignments 10%Attendance 3%Homework 4 %  total: 35% |
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| **15. Course Reading List and References‌:**1. Heywood, I., Cornelius, S., & Carver, S. (2005). An introduction to geographical information systems. *Zarządzanie Publiczne. Zeszyty Naukowe Instytutu Spraw Publicznych Uniwersytetu Jagiellońskiego*, (1).
2. Clarke, K.C. 2011. Getting Started with Geographic Information Systems, Fifth Edition. Pearson-Prentice Hall.
3. Jensen, J.R. and Jensen, R.R. **2013**. *Introductory Geographic Information Systems*. Pearson. ArcGIS Desktop:
4. Law, M. and Collins, A. **2018**. *Getting to Know ArcGIS for Desktop, Fifth Edition.* Esri Press.
5. Price, M. **2019**. *Mastering ArcGIS, Eighth Edition*. McGraw-Hill.
6. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2005). *Geographic information systems and science*. John Wiley & Sons.
7. Kennedy, M. D. (2013). *Introducing geographic information systems with ARCGIS: a workbook approach to learning GIS*. John Wiley & Sons.
8. Kent, R. B., & Klosterman, R. E. (2000). GIS and mapping: Pitfalls for planners. *Journal of the American Planning Association*, *66*(2), 189-198.
9. Different internet websites which is given during labs because there are changeable.
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| **16. The Topics:** | **Lecturer's name** |
| *Week1:* ***Introduction to GIS and ArcMap Interfaces*.***Weeks 2:* ***Creating and* Editing Geodatabases** **(Assignment 1)***Weeks 3 and 4:* ***(*Data Types), create, display and edit Data types***Week 5:* ***Adding (X, Y, Z) data (GPS points), add filed, edit attribute, symbolizing data.*** **(Assignment 2)***Week 6:* **Geo-Referencing and Digitizing***Week 7:****DEM data analysis (Raster Analysis) deriving slope, contour from DEM)***  **(Assignment 3)** *Week 8:* ***Interpolation techniques (IDW, Kriging, Spline, … etc)*** *Weeks 9:* ***Hydrological analysis*** *(e.g., stream orders)***(Assignment 4)**  *Week 10:* **Geological Mapping** **regarding to field data***Week 11:* **Topographic and Environmental indices (TWI, NDVI)****(Assignment 5)**  *Week 12:* ***Editing and using Queries*** *Week 13:* ***Map Layout preparation (Map Elements)*** *Week14:* ***Export Map in Different Formats*****(Assignment 6)**  *Week15:* satellite images analysis (LULC classification) **Examination.** | 2 hrs. per each labBy Kaiwan Kareemkhan Fatah |
|  **Kaiwan Kareemkhan** **MSc. In Applied GIS & RS** **PhD student in Applied GIS and RS** |