King Saud University

 College of Computer and Information Sciences

Department of Information Systems

**Course: IS 492 – Introduction to Geographic Information Systems**

**Semester: First Semester 1439/1440 H (2018) Lectures & Tutorials: Dr. Omer Alrwais E-mail:** **oalrwais@ksu.edu.sa** **Office Number: 2106**

**Course Description:**

This course introduces students to a mix of geographic information system theory and applications. Topics include geographic projection and coordinate systems, spatial data management, spatial analysis, concept of topology, models of spatial data (focusing on raster and vector models), spatial analysis techniques, and GIS implementation issues. By the end of the course, students are expected to have a thorough understanding of GIS development, functionality, methodology for implementing the technology, and its potential usefulness in geographic and environmental studies.

**Course Learning Outcomes:**

Upon the successful completion of this course, a student should be able to:

* Describe the basic concepts, components, applications and advantages of GIS
* Distinguish between the different data models of GIS
* Load, process, analyze and visualize data on a GIS software
* Learn to think spatially, analytically, and critically about challenging problems
* Discuss and demonstrate fundamental cartographic concepts and principles

**Student Outcomes Covered by the Course:**

|  |  |  |
| --- | --- | --- |
| **Outcome** |  **Student Outcome Description** | **Coverage** |
| (a) | An ability to apply knowledge of computing and mathematics appropriate to the discipline | **√** |
| (b) | An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution | **√** |
| (c) | An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs | **√** |
| (d) | An ability to function effectively on teams to accomplish a common goal | **√** |
| (e) | An understanding of professional, ethical, legal, security and social issues and responsibilities |  |
| (f) | An ability to communicate effectively with a range of audiences |  |
| (g) | An ability to analyze the local and global impact of computing on individuals, organizations, and society | **√** |
| (h) | Recognition of the need for and an ability to engage in continuing professional development |  |
| (i) | An ability to use current techniques, skills, and tools necessary for computing practice. |  |
| (j) | An understanding of processes that support the delivery and management of information systems within a specific application environment. |  |

**Course Materials:** <https://lms.ksu.edu.sa>

**Textbooks:**

 Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, Geographic Information Science and Systems, 4th Edition, Wiley publishing, 2015, ISBN-13: 978-1118676950 (S1)

Dawod, Gomaa M., 2014, Principles of GIS Science (in Arabic), Holy Makkah, Saudi Arabia (S2).

**Additional Readings:**

Ian Heywood, Sarah Cornelius, Steve Carver, An introduction to geographical information systems, 4th edition, Pearson, 2012, ISBN-13: 978-0273722595

Paul Bolstad, GIS Fundamentals: A First Text on Geographic Information Systems, Fifth Edition, 2016, ISBN-13: 978-1506695877

Jensen, John R., and Ryan R. Jensen, Introductory geographic information systems, Pearson, 2012, Kindle Edition.

**Tentative Schedule:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Week Number** | **Lecture** | **Lab** | **S1** | **S2** |
| 1 | **Course Introduction**  | **None** |  |  |
| 2 | **GIS components**  | **3.1: Working with Vector Data** | **Chapter 1 :Systems, science, and study. Chapter 2: A gallery of applications.** | **Chapter 1:Introduction** **Chapter 2:Applications** |
| 3 | **GIS data models + Symbology** | **3.2: Symbology + 4.1,4.2: Labeling** | **Chapter 3: Representing geography** | **Chapter 3: Location representation** |
| 4 | **None**  | **4.3: Classification + 5.1: Map composer** |  |  |
| 5 | **Vector data analysis**  | **6.1: Creating vector data + 6.3: Topology** | **Chapter 14: Query, measurement, and transformation** | **Chapter 14: Query, measurement, and transformation** |
| 6 | **Vector data analysis (continued)** | **7.2: Vector analysis + 7.3: Network Analysis** | **Chapter 15: Descriptive summary, design, and inference** | **Chapter 15: Descriptive summary, design, and inference** |
| 7 | **Raster data analysis** | **7.4: Spatial Statistics** | **Chapter 14** | **Chapter 14** |
| 8 | **Review** | **8.1: Working with Raster Data + 8.3: Terrain Analysis** |  |  |
| 9 | **Mid Term Exam** |  | **Chapter 6** | **Chapter 6** |
| 10 | **Data Quality** | **9: Completing the Analysis** | **9.4: Exercise** |  |
| 11 | **Spatial databases** | **10: Plugins** |  |  |
| 12 | **Global Positioning Systems** | **11. Web Mapping Services** |  |  |
| 13 | **Remote Sensing** | **13: GRASS Module** |  |  |
| 14 | **GIS modeling and Spatial interpolation** | **Importing Open street maps** |  |  |
| 15 | **Future of GIS** | **Georeferencing + Creating Heatmaps** |  |  |
| 16 | **Review** | **Project Presentations** |  |  |

**Course Policies:**

1. Anyone with absence of 25% or more will be barred from entering the final exam, NO EXCEPTIONS will be made (even if the student is in his/her final Semester).
2. NO medical excuses should be accepted as a way for deducting the number of absence days (25% of allowed absence in a Semester is actually there for the purpose of such health or other emergency circumstances).
3. A medical excuse may only be used in the case that a student misses an exam (to allow for a make-up exam), however, the absence will still be counted.
4. Copying a project or a homework assignment from another student results in zero grading.
5. A 20% will be deducted from late assignments.

**Grade Distribution:**

Lab Assignments 20%

Course Project 20%

Mid-Term Exam 20%

Final Exam 40%

**Total 100%**