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| --- | --- | --- |
| **1** | **Course title** | Environmental Information Systems |
| **2** | **Course number** | 0604330 |
| **3** | **Credit hours** | 3 |  |
| **Contact hours (theory, practical)** | 5 |
| **4** | **Prerequisites/corequisites** | 1932102 |
| **5** | **Program title** | Land, Water and Environment |
| **6** | **Program code** | 04 |
| **7** | **Awarding institution**  | The University of Jordan |
| **8** | **School** | Agriculture |
| **9** | **Department** | Land, Water and Environment |
| **10** | **Course level**  | BSc |
| **11** | **Year of study and semester (s)** | 2023/2024, Sem1 |
| **12** | **Other department (s) involved in teaching the course** |  |
| **13** | **Main teaching language** | English |
| **14** | **Delivery method** | ⌧Face to face learning ☐Blended ☐Fully online |
| **15** | **Online platforms(s)** | ☐Moodle 🞎Microsoft Teams ☐Skype ☐Zoom ☐Others………… |
| **16** | **Issuing/Revision Date** |  |

**17 Course Coordinator:**

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| --- |
| Name: Prof. Jawad Al-Bakri Office number: 052 Phone number: 22449Contact hours: 10:00-11:30 Sun, TueEmail: jbakri@ju.edu.jo  |

**18. Other instructors: Same as coordinator**

**19. Course Description:**

|  |
| --- |
| Introduction to systems and technology for information management. Principles of GIS utilized for management of natural resources. Data acquisition and data sources. Principles and application of remote sensing technologies. Field use of Global Positioning Systems (GPS). Data preprocessing and management. Data manipulation and analysis.  |

**20. Program Intended Learning Outcomes:** Land, Water and Environment BSc Program ILOS

1. Demonstrate comprehensive understanding of the scientific and theoretical knowledge of land, water and environment.
2. Contribute to agricultural development, as well as food and water security.
3. Demonstrate problem solving skills and well developed linguistic and communication skills while upholding professional ethics
4. Assess land characteristics and their suitability for different agricultural uses.
5. Tackle basic problems of water, land and agricultural environment.
6. Analyse and interpret soil and water quality parameters.
7. Use sound scientific principles for the determination of crop water requirement, and design of irrigation systems for the proper management of agricultural water.
8. Determine the optimal use of water and land to ensure the sustainability of resources and the environment.
9. Develop​ innovative solution for tackling the adverse effects of water scarcity caused by climate change and desertification​

**21. Course Intended Learning Outcomes:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| A- Aims:1. To provide the student with the main components, functions and capabilities of GIS and spatial analysis, as a tool for environmental information system 2. To provide the student with background on GIS and its related technologies.3. To enable the students to prepare and analyze spatial data related to land, water and environment.4. To promote the use of geospatial technology in planning and managing land and water resources.B- Students Learning Outcomes (SLOs):

|  |  |
| --- | --- |
| Course ILOs | The learning levels to be achieved |
| Remembering | Understanding | Applying | Analysing | evaluating | Creating |
| 1.A1 | √ | √ |  | √ |  |  |
| 2.A2 | √ | √ |  |  | √ | √ |
| 3.A3 | √ | √ |  |  | √ | √ |
| 4.B1 | √ |  |  | √ |  |  |
| 5.B2 |  |  |  |  |  | √ |
| 6.C1 |  |  |  | √ | √ |  |
| 7.C2 |  |  |  | √ | √ |  |
| 8.D1 | √ | √ | √ |  |  | √ |
| 9.D2 | √ | √ | √ |  |  |  |

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**22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program.**

Upon successful completion of this course, students will be able to:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Program SLOs | ILO (1) | ILO (2) | ILO (3) | ILO (4) | ILO (5) | ILO (6) | ILO (7) | ILO (8) | ILO (9) |
| ILOs of the course |
| **Knowledge and Understanding:**1. GIS components and areas of application.2. Concepts of entities, attributes and data models used in GIS.3. Coordinates, map projection and GPS. | X |  |  |  |  |  |  | X | X |
| **Intellectual Analytical and Cognitive Skills:**4. Concepts of cartography, map components and symbolization.5. Spatial analysis and capabilities of GIS. |  | X |  |  | X | X |  |  |  |
|  **Subject- Specific Skills:**6. Open source data and GIS.7. Terrain analysis and water resources management |  | X |  |  | X |  |  | X | X |
| **Transferable Key Skills:**8. Processing of vector and raster data9. Collection and preparation of GIS data |  |  | X | X |  |  |  |  |  |

**23. Topic Outline and Schedule:**

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| **Week** | **Lecture** | **Topic** | **Intended Learning Outcome** | **Learning Methods (Face to Face/Blended/ Fully Online)** | **Platform** | **Synchronous / Asynchronous Lecturing** | **Evaluation Methods** | **Resources** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1.1 |  GIS and its components | 1, 2 |  Face to Face  |  | S | Quiz01 |  B1-Ch1 |
| 1.2 | Application areas of GIS | 1, 2, 7 |  Face to Face  |  | S | Quiz01 |  B1-Ch1 |
| 1.3 |  GIS software-Practical | 8,9 |  Face to Face  |  | S |  Rep.01 |  1,2 |
| 2 | 2.1 | Entities and attributes | 2, 3 |  Face to Face  |  | S |  Quiz01 |  B1-Ch2 |
| 2.2 |  Vector data model | 2, 3 | Face to Face |  | S | Quiz 01 | B1-Ch2 |
| 2.3 |  Display of vector-Practical  | 5, 8 | Face to Face |  | S |  Rep.02 |  1,2 |
| 3 | 3.1 | Vector data model | 2, 3 | Face to Face |  | S | Quiz02 | B1-Ch2 |
| 3.2 |  Raster data model | 2, 3 | Face to Face |  | S | Quiz02 | B1-Ch2 |
| 3.3 |  Display of raster-Practical | 6,8 | Face to Face |  | S |  Rep.03 |   1,2 |
| 4 | 4.1 |  Coordinates in GIS |  4 | Face to Face |  | S | Quiz02 | B1-Ch3B2-Ch2 |
| 4.2 |  Ellipsoid and datum |  4 | Face to Face |  | S |  Quiz02 | B3-Ch3 |
| 4.3 | Selection on vector-Practical | 5,8 | Face to Face |  | S |  Rep.04 | 1,2 |
| 5 | 5.1 |  GPS technology | 3 | Face to Face |  | S |  Quiz02 |  B1-Ch5 |
| 5.2 |  Map projections | 3,6 | Face to Face |  | S |  Quiz 02 |  B1-Ch3 |
| 5.3 |  Managing attributes of vector-Practical | 8,9 | Face to Face |  | S | Rep.05 | 1,2 |
| 6 | 6.1 |  Getting data into GIS  | 6,8,9 | Face to Face |  | S | Quiz03 | 2, B1-Ch7 |
| 6.2 |  Editing of data within GIS environment | 1,8,9 | Face to Face |  | S | Quiz03 |  2, B1-Ch4 |
| 6.3 |  Adding fields to attribute table-Practical | 2,8,9 | Face to Face |  | S |  Rep.06 |   1,2 |
| 7 | 7.1 |  Geodatabases  | 2,6 | Face to Face |  | S |  Quiz03 |  B1-Ch8 |
| 7.2 |  Join of data | 8,9 | Face to Face |  | S |  Quiz03 | B2-Ch9 |
| 7.3 |  Creating vector data-Practical | 8,9 | Face to Face |  | S | Rep.07 | 1,2 |
| 8 | 8.1 |  Map elements | 4 | Face to Face |  | S | Quiz03 | B1-Ch4B2-Ch10 |
| 8.2 |  Map elements | 4 | Face to Face |  | S | Quiz03 | B1-Ch4B2-Ch10 |
| 8.3 | Creating map layouts-Practical  | 4 | Face to Face |  | S |  Exam-lab |   1,2 |
| 9 | 9.1 |  Types of maps | 1,4 | Face to Face |  | S |  Quiz04 | B1-Ch4B3-Ch3 |
| 9.2 |  Types of maps | 1,4 | Face to Face |  | S |  Quiz04 | B1-Ch4B3-Ch3 |
| 9.3 |  Data for GIS: Hardcopy maps- practical | 4,7,9 | Face to Face |  | S |  Rep.08 | 1,2 |
| 10 | 10.1 | Design of map layout | 4 | Face to Face |  | S |  Quiz04 | B2-Ch10B3-Ch3 |
| 10.2 | Design of map layout | 4 | Face to Face |  | S | Quiz04 | B2-Ch10B3-Ch3 |
| 10.3 |  Map layout-practical | 4 | Face to Face |  | S |  Rep.09 |   1,2 |
| 11 | 11.1 |  Spatial analysis-selection and operations | 5,7 | Face to Face |  | S |  Quiz04 | B1-Ch9 |
| 11.2 |  Spatial analysis-proximity | 5,7 | Face to Face |  | S |  Quiz04 | B2-Ch12 |
| 11.3 |  Classification of vector data-Practical | 4,5,7 | Face to Face |  | S |  Rep.10 |  1,2 B3-Ch9 |
| 12 | 12.1 |  Map overlay and Geoprocessing | 5,7 | Face to Face |  | S | Quiz05 |  B2-Ch12 |
| 12.2 |   Map overlay and Geoprocessing | 5,7 | Face to Face |  | S | Quiz05 |  B2-Ch12 |
| 12.3 | GIS project: data collection-Practical | 3,8,9 | Blended |  | S |  Assign. |  1,2  |
| 13 | 13.1 |  Raster data sources | 6 | Face to Face |  | S | Quiz05 |  B1-Ch6 |
| 13.2 |  Raster analysis | 6 | Face to Face |  | S | Quiz05 | B2-Ch13 |
| 13.3 |  GIS project: data entry-Practical | 6,7 | Blended |  | S |  Assign. |   1,2 |
| 14 | 14.1 | Terrain mapping: DEM and viewsheds | 6,7 | Face to Face |  | S |  Quiz05 | B1-Ch11B2-Ch13 |
| 14.2 | Terrain mapping: slope and flow  | 6,7 | Face to Face |  | S |  Quiz05 | B1-Ch11B2-Ch13 |
| 14.3 | GIS project: data processing-Practical  | 5, 7,8,9 | Blended |  | S |  Assign. |   1,2 |
| 15 | 15.1 | Terrain mapping: hydrological functions in GIS | 7 | Face to Face |  | S |  Assign. | B1-Ch11B2-Ch13 |
| 15.2 | Terrain mapping: hydrological functions in GIS | 7 | Face to Face |  | S |  Assign. | B1-Ch11B2-Ch13 |
| 15.3 |  GIS project: Output-Practical | 4,5,7,8,9 | Blended |  | S |  Assign. | 1,2 |

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**24 Evaluation Methods:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Evaluation Activity** | **Mark** | **Topic(s)** | **SLOs** | **Period (Week)** | **Platform** |
| Quiz 01 |  2 |  1.1, 1.2 , 2.1 | 1-3 | 2 |  Hardcopy |
| Quiz 02  |  2 |  2.1, 3.1, 3.2, 4.1, 4.2, 5.1 | 1-4 | 5 |  Hardcopy |
| Quiz 03  | 2 | 5.2, 6.1, 6.2, 7.1, 7.2, 8.1 | 2,3 | 8 |  Hardcopy |
| Quiz 04  | 2 |  8.2, 9.1, 9.2, 10.1, 10.2, 11.1 | 5,6 |  11 |  Hardcopy |
| Quiz 05  | 2 | 11.2 ,12.1, 12.2, 13.1, 13.2 | 5,6 | 14 |  Hardcopy |
|  Reports (Rep.01-Rep.10) |  15 |  1.3, 2.3 ,3.3, 4.3, 5.3, 6.3, 7.3, 8.3, 9.3 ,10.3 | 1-6, 8 |  1-10 |  Hardcopy |
| Project and assignment  | 5 | 14.1, 14.2, 14.3, 15.1, 15.2, 15.3 | 1-6, 8 | 12-15 | QGIS |
| Midterm Exam | 30 | 1.x-6.x | 1-6, 8 | 8 | Hardcopy |
| Final Hour Exam | 40 | 1.x-15.x | 1-6, 8 | 16 | Hardcopy |

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**25 Course Requirements**

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| **(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):**  |

**26 Course Policies:**

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| --- |
| A- Attendance policies: obligatoryB- Absences from exams and submitting assignments on time: make up for accepted excusesC- Health and safety procedures: UOJ regulations appliedD- Honesty policy regarding cheating, plagiarism, misbehavior: UOJ regulations appliedE- Grading policy: using class average and standard deviations F- Available university services that support achievement in the course: GIS lab facility and GPS units available for students to use and to carry out practical sessions. |

**27 References:**

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| A- Required book(s), assigned reading and audio-visuals:1- A gentle introduction to GIS (https://docs.qgis.org/3.16/en/docs/gentle\_gis\_introduction/)2- Al-Bakri, J. 2021. GIS and Remote Sensing Manual: QGIS Software, The University of Jordan, Amman, Jordan.B- Recommended books, materials, and media:B1 Bolstad, P., 2019. ***GIS Fundamentals: A first text on Geographic Information Systems*** (6th edition), Eider Press, White Bear Lake, Minnesota. (http://www.paulbolstad.net/gisbook.html).B2 Chang, K., 2018. ***Introduction to Geographic Information Systems***, 9th edition, McGraw Hill, New York.B3 DeMers, M. N. 2009. ***Fundamentals of Geographical Information Systems***, 4th Edition, John Wiley and Sons.B4 ArcGIS 10.1 Online Help. http://resources.arcgis.com/en/help/main/10.1/  |

**26 Additional information:**

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| --- | --- | --- |
| Name of the Instructor or the Course Coordinator:**Prof. Jawad Al-Bakri**  | Signature:  | Date: 25/9/2024 |
| Name of the Head of Quality Assurance Committee/ Department…………………………………………………. | Signature: …………...……………… | Date: ……..………… |
| Name of the Head of Department…………………………………………………. | Signature: …………...……………… | Date: ……..………… |
| Name of the Head of Quality Assurance Committee/ School or Center…………………………………………………. | Signature: …………...……………… | Date: ……..………… |
| Name of the Dean or the Director…………………………………………………. | Signature: …………...……………… | Date: ……..………… |