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| Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Software Engineering Department | QF01/0408-4.0E |
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|----------------|---|---|--|---|---|-----------------------|
| Study plan No. | 2021/2022 | | University Specialization | | Master of Computer Science | |
| Course No. | 102741 | | Course name | | Advanced Database Systems | |
| Credit Hours | 3 | | Prerequisite Co-requisite | | | |
| Course type | <input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT | <input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS | <input type="checkbox"/> FACULTY MANDATORY REQUIREMENT | <input type="checkbox"/> Support course family requirements | <input type="checkbox"/> Mandatory requirements | Elective requirements |
| Teaching style | <input type="checkbox"/> Full online learning | | <input type="checkbox"/> Blended learning | | Traditional learning | |
| Teaching model | <input type="checkbox"/> 2Synchronous: 1asynchronous | | <input type="checkbox"/> 2 face to face : 1synchronous | | 3 Traditional | |

Faculty member and study divisions information (to be filled in each semester by the subject instructor)

| Name | Academic rank | Office No. | Phone No. | E-mail | |
|--------------------|---------------------|------------|--------------------|-----------------------|----------------|
| Dr. Bilal Hawashin | Associate Professor | | | b.hawashin@zuj.edu.jo | |
| Division number | Time | Place | Number of students | Teaching style | Approved model |
| 1 | 4-7 | 347 | 11 | Traditional | |
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Brief description

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| 1. The course would include the following topics: Types of Data Mining, Types of Data, Data Preprocessing, Classification, Clustering, Database Indexing , Query Processing, Query Optimization, Concurrency Control, Recovery System. |
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Learning resources

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| Course book information (Title, author, date of issue, publisher ... etc) | <p>1- Database System Concepts. Avi Silberschatz Henry F. Korth S. Sudarshan McGraw-Hill ISBN 9780078022159, 2019.</p> <p>2- Ian Witten, Eibe Frank, Mark Hall, and Christopher Pal. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2016.</p> |
| Supportive learning resources (Books, databases, periodicals, software, applications, others) | 1. Charu Aggarwal. Data Mining, the text book. Springer. 2015 |
| Supporting websites | |

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|---------------------------------------|--|-------------------------------|---|---------------------------------|
| The physical environment for teaching | <input checked="" type="checkbox"/> Class room | <input type="checkbox"/> labs | <input type="checkbox"/> Virtual educational platform | <input type="checkbox"/> Others |
| Necessary equipment and software | | | | |
| Supporting people with special needs | | | | |
| For technical support | | | | |

Course learning outcomes (S= Skills, C= Competences K= Knowledge,)

| No. | Course learning outcomes | The associated program learning output code |
|--------------------|--|---|
| Knowledge | | |
| K1 | To be fully acquainted with advanced database topics | |
| K2 | To show an adequate understanding of various data mining advanced topics | |
| K3 | | |
| Skills | | |
| S1 | To be able to solve problems related to advanced databases | |
| S2 | To be able to solve problems in advanced data mining | |
| S3 | To be able to write a scientific research paper using the scientific research methodology | |
| Competences | | |
| C1 | To be able to criticize works and provide novel solutions in trending research topics in databases and data science. | |

Mechanisms for direct evaluation of learning outcomes

| Type of assessment / learning style | Traditional Learning (Theory Learning) |
|-------------------------------------|--|
| Second / midterm exam | %25 |
| Homeworks | %25 |
| final exam | %50 |

Note: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Schedule of simultaneous / face-to-face encounters and their topics

| Week | Subject | learning style* | Reference ** |
|------|---|-----------------|--------------|
| 1 | Data Mining Concepts. Types of data mining algorithms. | Lecture | 1-88 (2) |
| 2 | Types of data. Data Preprocessing. Data Quality. | Lecture | 1-88 (2) |
| 3 | Term Document matrix, Similarity | Lecture | 145-315 (2) |

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| | and Distance | | |
| 4 | KNN and SVM Classifiers | Lecture | 145-315 (2) |
| 5 | Weka Toolkit | participatory learning | Handout |
| 6 | Decision Trees | Lecture | 145-315 (2) |
| 7 | Artificial Neural Networks | Lecture | 145-315 (2) |
| 8 | Clustering, KMeans | Lecture | 145-315 (2) |
| 9 | Mid Term 25%. Research Project is out. | learning through problem solving | |
| 10 | Hierarchical Clustering | Lecture | 145-315 (2) |
| 11 | Database Indexing and Hashing. Index usage. Index Types. B+-Index. Hash Index. | Lecture | 481-529 (1) |
| 12 | Query Processing. Measures of Query Cost. Selection Operation. Sorting. Join. Other operations. | Lecture | 531-568 (1) |
| 13 | Query Optimization. Transformation of Relational Expressions. Estimating Statistics of Expression Results. Choice of Evaluation Plans. | Lecture | 569-602 (1) |
| 14 | Concurrency Control. Lock Based Protocols. Timestamp Based Protocols. Validation Based Protocols. Multiple Granularity. Deadlock Handling. | Lecture | 635-680 (1) |
| 15 | Recovery System. Failure Classification. Log Based Recovery. Failure with Loss of Nonvolatile Storage. Remote Backup Systems. | Lecture | 683-718 (1) |
| 16 | Final Exam 50% | learning through problem solving | |

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.