

**Graduate School of Health Sciences / Health Management M.S**

**2023 - 2024 Academic Year**

**DATA MINING in HEALTHCARE SYSTEMS**

**Syllabus**

| Course Description  |   |   |                          |                           |      |
|---|---|---|--------------------------|---------------------------|------|
| Name  | Code  | Semester  | T+A Hour                 | Credit                    | ECTS |
| DATA MINING in HEALTHCARE SYSTEMS   | SAYY1169710   | Fall Semester   | 3+0                      | 3                         | 8    |
| <b>Prerequisites Courses</b>  |   |   |                          |                           |      |
| <b>Recommended Elective Courses</b>   | CURRENT SYSTEMS AND ADVANCED TOPICS IN HEALTH INFORMATION   |   |                          |                           |      |
| <b>Language of Instruction</b>  | Turkish   |   |                          |                           |      |
| <b>Course Level</b>   | Second Cycle (Master's Degree)  |   |                          |                           |      |
| <b>Course Type</b>  | Elective  |   |                          |                           |      |
| <b>Course Coordinator</b>   | Assist.Prof. Erman GEDİKLİ  |   |                          |                           |      |
| <b>Name of Lecturer(s)</b>  | Prof.Dr. Hakan TOZAN  |   |                          |                           |      |
| <b>Assistant(s)</b>   | As.Ress.Yaşar Gökalp  |   |                          |                           |      |
| <b>Aim</b>  | To recognize the basic concepts and methods of data mining, interpret and apply common data mining methods including clustering and classification, design a data mining model for a given problem, and apply, and interpret the main clinical and managerial decision support systems in healthcare.   |   |                          |                           |      |
| <b>Course Content</b>   | This course contains; Introduction to Data Mining ,Data Mining Process,Data Discovery and Visualization,Feature Selection and Data Transformation,Clustering Methods,Exercise: Clustering,Classification Methods - Decision Trees,Exercise: Classifications,Exercise: Classifications,Association Rule Mining,Exercise: Association rule mining,Exercise: Problem oriented data mining,Midterm project presentations,Midterm project presentations. |   |                          |                           |      |
| <b>Course Learning Outcomes</b>   |   |   | <b>Teaching Methods</b>  | <b>Assessment Methods</b> |      |
| Explain the basic concepts and processes in data mining   |   |   | 16, 18, 9                | A                         |      |
| Define data mining and its objectives   |   |   | 16, 9                    | A                         |      |
| Explain basic concepts, including data, database, data warehouse, etc                               |   |   | 16, 9                    | A                         |      |
| Describe the data mining process.   |   |   | 16, 9                    | A                         |      |
| Explain common data mining methods  |   |   | 13, 14, 16, 18, 6, 8, 9  | A                         |      |
| Explains classification and clustering method   |   |   | 16, 9                    | A                         |      |
| Distinguish the appropriate method for a given data mining problem.                                 |   |   | 10, 13, 16, 4, 6, 9      | A                         |      |
| Distinguish the differences between descriptive and predictive methods                              |   |   | 16, 6, 9                 | A                         |      |
| Propose a correct (supervised/unsupervised) method for a given data mining problem                  |   |   | 16, 6, 9                 | A, G                      |      |
| Interpret the most possible methods for a given data set with respect to the data types and pattern |   |   | 16, 6, 9                 | A                         |      |
| Explain the clinical and management decision support systems.                                       |   |   | 14, 18, 4, 5, 6, 9       | A                         |      |
| Explain the knowledge-based DSSs  |   |   | 16, 9                    | A                         |      |
| Explain the learning-based DSSs   |   |   | 16, 9                    | A                         |      |
| Explain the data mining and its sub-processes   |   |   | 16, 9                    | A                         |      |
| Use an open source data mining tool (KNIME)   |   |   | 14, 16, 2, 4, 5, 6, 8, 9 | E, F                      |      |
| Apply the data preprocess method with KNIME   |   |   | 12, 16, 18, 8, 9         | E, F                      |      |
| Use the clustering methods with KNIME   |   |   | 16, 4, 8, 9              | A, E, F                   |      |
| Use the classification methods with KNIME   |   |   | 16, 8, 9                 | A, E                      |      |
| Use the association rules with KNIME  |   |   | 16, 6, 9                 | A                         |      |
| <b>Teaching Methods</b>   | 10: Discussion Method, 12: Problem Solving Method, 13: Case Study Method, 14: Self Study Method, 16: Question - Answer Technique, 18: Micro Teaching Technique, 2: Project Based Learning Model, 4: Inquiry-Based Learning, 5: Cooperative Learning, 6: Experiential Learning, 8: Flipped Classroom Learning, 9: Lecture Method   |   |                          |                           |      |
| <b>Assessment Methods</b>   | A: Traditional Written Exam, E: Homework, F: Project Task, G: Quiz  |   |                          |                           |      |
| <b>Lecture Schedule</b>   |   |   |                          |                           |      |
| <b>Sequence</b>   | <b>Topics</b>   | <b>Preliminary Preparation</b>  |                          |                           |      |
| 1   | Introduction to Data Mining   | Basic database concepts   |                          |                           |      |
| 2   | Data Mining Process   | The usage of SQL as DML; TSQL; data warehouse architectures, the reasons yield data manipulation  |                          |                           |      |
| 3   | Data Discovery and Visualization  | The graph types in data visualization and the components of a graph, such as dimension, measure, etc.   |                          |                           |      |
| 4   | Feature Selection and Data Transformation   | Data types, generalization, specialization of data  |                          |                           |      |
| 5   | Clustering Methods  | Main clustering approaches, such as Hierarchical Clustering, Centroid-based Clustering, Density-based Clustering, Distribution-based Clustering.          |                          |                           |      |
| 6   | Exercise: Clustering  | The exercises with KNIME for especially clustering  |                          |                           |      |
| 7   | Classification Methods - Decision Trees   | The main differences between clustering and classifications, how to generate a decision tree and the main decision tree algorithms, such as ID 3 and C4.5 |                          |                           |      |
| 8   | Exercise: Classifications   | The exercises with KNIME for especially classification  |                          |                           |      |
| 9   | Exercise: Classifications   | The exercises with KNIME for especially classification  |                          |                           |      |
| 10  | Association Rule Mining   | Market box analysis   |                          |                           |      |
| 11  | Exercise: Association rule mining   | The exercises with KNIME for especially ARM   |                          |                           |      |
| 12  | Exercise: Problem oriented data mining  | Clustering, decision trees, association rule mining   |                          |                           |      |
| 13  | Midterm project presentations   | A data mining solution having feature selection, data transformation, data mining application and evaluation of the result                                |                          |                           |      |
| 14  | Midterm project presentations   | A data mining solution having feature selection, data transformation, data mining application and evaluation of the result                                |                          |                           |      |
| <b>Evaluation Methods</b>   |   | <b>Weight(%)</b>  |                          |                           |      |
| Midterm Exam  |   | 50  |                          |                           |      |
| General Exam  |   | 50  |                          |                           |      |

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**Resources**

Lecture notes and lab sheets (will be shared regularly on the lecture pages)

- Veri Madenciliđi Teori Uygulama ve Felsefesi, Dr. İlker KÖSE (2015)
- Kavram ve Algoritmalarıyla Temel Veri Madenciliđi, Dr. Gökhan SİLAHTAROđLU
- Veri Madenciliđi Yöntemleri, Dr. Yalçın ÖZKAN
- Han Jiawei and Kamber Micheline (2006), Data Mining: Concepts and Techniques, Morgan Kaufmann Publisher San Francisco
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Addison Wesley, (2005)