Introduction to Data Science and Big Data Analytics

Course Code:

CSE 464

Course Period:

Autumn

Course Type:

Area Elective

Credits:

3

Theoric:

3

Practice:

0

Laboratory Hour:

0

ECTS:

5

Course Language:

English

Course Objectives:

This course aims to provide an introduction to the data science and data analytics using the methods of statistical learning, an approach blending classical statistical methods with recent advances in computational and machine learning. The course will cover the main analytical methods from this field with hands-on applications using example datasets, so that students gain experience with and confidence in using the covered methods.

Course Content:

Data Science and Big Data Analytics, Relational Databases and Data Modeling, Data Warehousing and Integration, Parallel Databases, Hadoop/ Mapreduce/Spark, Data Visualization, Machine Learning, Classification and Regression, Clustering, Natural Language Processing, Information Retrieval, Network Analysis

Course Methodology:

1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study

Course Evaluation Methods:

A: Testing, B: Experiment, C: Homework, D: Project

Course Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1. Knowledge about the basic methodologies in data science and big data analytics.	3	1,2	A,C,D
1. Ability to use knowledge to formulate, and solve practical problems using data science and big data analytics techniques.	2	1,2,4	A,C

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction to Data Science and Big Data Analytics	Textbook
2	Relational Databases and Data Modeling	Textbook
3	Data Warehousing and Integration	Textbook
4	Parallel Databases/Hadoop	Textbook
5	Mapreduce/Spark	Textbook
6	Data Visualization	Textbook
7	Introduction to Machine Learning	Textbook
8	Classification and Regression	Textbook
9	Clustering	Textbook
10	Midterm	Textbook

11	Introduction to Natural Language Processing	Textbook
12	Introduction to Information Retrieval	Textbook
13	Network Analysis	Textbook
14	Project Presentations	Textbook

RECOMMENDED SOURCES

Textbook	Data Science from Scratch, O'Reilly Media, Joel Grus (2015)
Additional Resources	Hands-On Machine Learning with Scikit-Learn and TensorFlow, O'Reilly Media, By Aurélien Géron (2017)

MATERIAL SHARING

Documents
Assignments
Exams

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Lab Work	1	10
Assignment	1	20
Midterm	1	30
Final Project	1	40
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.	√

2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.	√
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose	√
4	Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.	√
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.	√
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	
7	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions.	
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	
9	Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice.	
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and knowledge about sustainable development.	
11	Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	2	28
Project	1	30	30
Assignment	1	10	10

Midterm Examination	1	3	3
Final examination	1	3	3
Total Work Load			116
Total Work Load / 25 (h)			4.64
ECTS Credit of the Course			5