

UNIVERSITY OF ECONOMICS - VARNA
MASTER DEGREE STUDIES CENTER
DEPARTMENT „INFORMATICS“

ACCEPTED BY:

Rector:

(Prof. Dr. Plamen Iliev)

SYLLABUS

SUBJECT: “DATA SCIENCE”;

DEGREE PROGRAMME: “Computer Science”; MASTER`S DEGREE

YEAR OF STUDY: 5 ; SEMESTER: 10 (same field graduates),

YEAR OF STUDY: 6 ; SEMESTER: 11 (other fields graduates);

TOTAL STUDENT WORKLOAD: 210 h.; incl. curricular 60 h.

CREDITS: 7

DISTRIBUTION OF WORKLOAD ACCORDING TO THE CURRICULUM

| <i>TYPE OF STUDY HOURS</i> | WORKLOAD, h. | TEACHING HOURS PER WEEK, h |
|-----------------------------|---------------------|-----------------------------------|
| CURRICULAR: | | |
| incl. | | |
| • LECTURES | 30 | 2 |
| • SEMINARS (lab. exercises) | 30 | 2 |
| EXTRACURRICULAR | 150 | - |

Prepared by:

1.
(Assoc.prof. Dr. Todorka Atanasova)

2.
(Assist.prof. Yanka Alexandrova)

Head of department:
“Informatics” (Prof. Dr. Vladimir Sulov)

I. ANNOTATION

The discipline Data Science introduces some of the main concepts in this interdisciplinary and fast developing field. During the course of study the students are taught how to extract useful insight and knowledge from data. Covered are some of the most used algorithms, techniques and methods such as data mining algorithms (decision trees, clustering, association analysis, etc.), big data analytics, data visualization tools, OLAP cubes, exploratory and confirmatory analysis, etc.

During the training students gain abilities to choose and apply a proper set of tools and methods depending on the available data sets and desirable outcome. Topics connected to business intelligence are also covered by the scope of the discipline. In order to achieve the learning objectives students are taught how to use advanced software tools and applications.

Students have opportunities to implement the acquired theoretical knowledge by solving different problems and tasks set by their project assignment. By finishing the course students can gain a solid basis for further improvement of their knowledge and skills needed to become data scientists.

II. THEMATIC CONTENT

| No. by row | TITLE OF UNIT AND SUBTOPICS | NUMBER OF HOURS | | |
|------------------|--|-----------------|---|-----------|
| | | L | S | L.E. |
| | 1. Data science – scope, science fields, tasks. Data science process. | 4 | | |
| | 2. Business intelligence (BI) systems | 10 | | |
| 2.1 | Nature, architectures, functions of BI systems | 2 | | |
| 2.2 | Data warehouse architectures. | 2 | | 4 |
| 2.3 | BI tools and methods. | 3 | | 2 |
| 2.4 | OLAP cubes. | 3 | | 4 |
| | 3. Big data analytics. | 2 | | |
| | 4. Exploratory data analysis. | 2 | | 4 |
| | 5. Confirmatory data analysis. | 2 | | 4 |
| | 4. Data Mining (DM) algorithms. | 8 | | |
| 4.1 | Classification of DM algorithm. | 2 | | 12 |
| 4.2 | Clustering. | 2 | | 4 |
| 4.3 | Decision trees. | 2 | | 4 |
| 4.4 | Association analysis. | 2 | | 4 |
| | 5. Data visualization tools. | 2 | | 4 |
| | Total: | 30 | | 30 |

III. FORMS OF CONTROL:

| No. by row | TYPE AND FORM OF CONTROL | № | extra-curricular, h. |
|-------------------|--|----------|-----------------------------|
| 1. | Midterm control | | |
| 1.1. | Tests (open and/or closed answers) | 1 | 30 |
| 1.2. | Project assignment | 1 | 60 |
| | Total midterm control: | 2 | 90 |
| 2. | Final term control | | |
| 2.1. | Exam (open and/or closed answers) | 1 | 60 |
| | Total final term control: | 1 | 60 |
| | Total for all types of control: | 3 | 150 |

IV. LITERATURE

REQUIRED (BASIC) LITERATURE:

1. Larose, Daniel T., Larose, Shantal D., Data Mining and Predictive Analytics, 2nd edition, John Wiley and sons, 2015
2. Schutt, Rachel, O'Neil, Cathy, Doing Data Science. Straight Talk From the Frontline, O'Reily, 2013.

RECOMMENDED (ADDITIONAL) LITERATURE:

1. Barlow, Mike, Learning to Love Data Science, O'Reily, 2015
2. LeBlanc, Patrick, Moss, Jesica M., Sarka, Dejan, Dustin, Ryan, Applied Microsoft Business Intelligence, John Wiley and sons, 2015
2. Tuffery, Stephane, Data Mining and Statistics for Decision Making, John Wiley and sons, 2011