Course title: Data Science

Teacher(s): Nenad Stefanovic, Marija Blagojević

Course status: elective

Number of ECTS credits: 10

Condition: None

Course objectives

Studying and mastering concepts, methods, techniques, and tools of Business Intelligence (BI), Data Science (DS) and Big Data analytics, and their application in science and research.

Learning outcomes

Acquired knowledge related to business analysis, information systems, data engineering (extract, transfer, load - ETL), dimensional data modelling, data warehouse design, OLAP (On Line Analytical Processing), Data Lakes, Data Mining/Machine Learning, cloud analytics services, Big Data analytics, performance management, reporting and data visualization.

Знања која су студенти стекли после савладавања програма: методе, технике и алате пословне интелигенције, односно науке о подацима (Data Science); пројектовање интелигентних информационих система у различитим областима коришћењем технологија и алата науке о подацима; примена науке о подацима у конкретним научно-истраживачким пројектима; истраживање и анализа реалних скупова података са циљем генерисања нових знања.

Knowledge obtained after course competition: methods, techniques, and tools of BI and Data Science; design of intelligent information systems in various domains using the data science technologies and tools; application od data science in concrete science and research projects; research and analysis of real-world datasets in order to extract new knowledge.

Students gain knowledge and skills for designing intelligent information systems based on data science technologies and tools (NoSQL, Data Warehouse, Data Lakes, Big Data, Data Mining/ Machine Learning), as well as application of BI systems in various business domains.

Contents

Theoretical lectures

Basic concepts of Business Intelligence; analysis and modelling of business systems; data warehousing and OLAP; Data Lakes; dimensional data modelling; BI performance tuning; Query languages (MDX, DAX, Python, etc.); real-time BI and business activity monitoring; Data Science methods and processes (CRISP-DM, KDD, Team Data Science Process, SEMMA, Domino); Python frameworks and libraries for data science; Machine Learning – algorithms, development methods, techniques, and applications; performance management (Key Performance Indicators-KPI, Balanced Scorecards); reporting; BI portals; Cloud Analytics; Intelligent services and digital assistants for analytics and decision making. Background research and critical analysis of literature and results in the data science domain; Research work on the concrete project.

Practical lectures

Case studies in application of intelligent information systems; Design and development of BI systems using adequate software tools and datasets. Working with cloud analytics services and tools. BI modules of leading ERP/SCM/CRM systems (SAP Analytics Cloud, Oracle Business Intelligence, Microsoft Dynamics BI); Big Data analytics (Hadoop, Spark, Pig, Mahout, Hive, HDInsight, Data Lake, Data Factory, Databricks, Azure Synapse Analytics, etc.); Stream Analytics; Excel, Power BI, Tableau tools for data modelling, reporting and visualization. Open-source BI systems and tools. Application of data science methods and tools with concrete datasets. Realization of the research work.

Recommended literature

1. Nenad Stefanovic, Business Intelligence in Complex B2B Networks, Faculty of Science, Kragujevac, 2016.
2. Has Altaiar, Jack Lee, Michael Pena, Cloud Analytics with Microsoft Azure: Build Modern Data Warehouses with the Combined Power of Analytics and Azure, Packt Publishing, 2019.
3. Ramesh Sharda, Dursun Delen, Efraim Turban, David King, Business Intelligence, Analytics, and Data Science: A Managerial Perspective, Pearson, 2017.
4. Wang, J. (Ed.). (2023). Encyclopedia of Data Science and Machine Learning (5 Volumes). IGI Global..
5. C.S.R. Prabhu, Aneesh Sreevallabh Chivukula, Aditya Mogadala, Rohit Ghosh, L.M. Jenila Livingston, Big Data Analytics: Systems, Algorithms, Applications, Springer, 2019.

Number of active classes: 7	Theory: 5	Practice: 2

Teaching methods

Combination of classic teaching with e-learning with appropriate literature. Problem-based learning, practical teaching, independent student work (assignments and projects). Application of modern web services (Office 365) in teaching, communication, teamwork, application development and collaboration. Regular and on-demand consultations both in person and via video conferencing platform.

Evaluation (maximum number of points 100)

Pretest - 30 points; project assignment – 40 points; final exam – 30 points.