

Name of the course: Data Mining in Smart Systems	Total credits: 2+2+1=5
IPM-18AUTDMSSEG	
Type: Obligatory	
Total hours of per semester: lecture: 26 practice: 26 consultation: 13 Other: projects in teamwork	
Type of testing: exam Other: projects, tests	
Semester: 2nd	
Description	
Data preprocessing, preparation (missing value imputation, noise handling and outlier detection, data transformation); clustering techniques (k-means, hierarchical, density-based); frequent pattern and association rule mining (Apriori, Eclat, FP-Growth); prediction models (linear and logistic regression, decision trees, SVM, Bayes models, kernels, matrix factorization); building model ensembles (ensembles, bagging, boosting); model evaluation (overfitting, bias-variance, cross-validation).	
Literature	
Compulsory	
<ul style="list-style-type: none"> • Mohammed J. Zaki and Wagner Meira Jr (2014). Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge University Press, 1st Edition. 562 pages. ISBN-13: 978-0521766333. (http://www.dataminingbook.info/) • Ethem Alpaydin (2009). Introduction to Machine Learning. The MIT Press, Adaptive Computation and Machine Learning series, 2nd edition. 584 pages. ISBN-13: 978-0262012430. 	
Recommended	
<ul style="list-style-type: none"> • Ian H. Witten, Eibe Frank and Mark A. Hall (2014). Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann, Series in Data Management Systems, 3rd Edition. 664 pages. SBN-13: 978-0123748560. • Christopher M. Bishop (2011). Pattern Recognition and Machine Learning. Springer, Information Science and Statistics series. 738 pages. ISBN-13: 978-0387310732. 	
Competencies	
Knowledge	
<ul style="list-style-type: none"> • Possession of complex and up-to-date knowledge in data science, knowledge and use of the main softwares of the field. • Detailed and expert-level knowledge of the technical terms and expressions of computer science in English. 	
Competencies	
<ul style="list-style-type: none"> • Expertise in the application of the concepts and methods of data science in complex data mining tasks as well as preparation of data science models according to requirements of data mining tasks. • Ability to formalize complex technical problems, to analyze theoretical and practical background, and to provide adequate solutions. • Expertise in design, development, operation and management tasks in the domain of complex 	

data analytics systems.

- Skills for cooperation and team work, and ability to take leading role.
- Ability for written and oral communication in English, using the technical terms and expressions of computer science. Ability to argue, to prepare reports, to read, understand and exploit scientific and technical material (e.g. books and papers).
- Expertise in utilizing sources of technical information, their critical interpretation and evaluation, and the extraction of information relevant to the solution of a specific problem.
- Ability to perform supervised scientific research, and skills required for post-graduate studies.

Attitude

- Attends professional, technological development related to their qualification.
- Commitment to critical feedback and self-assessment.
- Commitment to lifelong learning and receptivity to new IT competencies.
- Adopts and coordinates the ethical principles of work, organizational culture and research.
- Shares professional knowledge, mediates professional results.
- Mediates and implements eco-conscious behavior and social responsibility, helping them with IT tools.
- Commitment to quality standards and its IT tools.
- Open to initiate collaboration with IT and other specialists.
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Autonomy and responsibility

- Takes responsibility for his professional decisions taken during his professional activities.
- Takes responsibility for observing and enforcing deadlines.
- Takes responsibility for own and fellow workers' work.
- In the case of operational critical IT systems, he/she can be assigned responsibility for development and operation, according to his/her professional competencies.