UBBFSEGA
Universitatea Babeş-Bolyai | Facultatea de Ştiinţe Economice şi Gestiunea Afacerilor
FSEGA CLUJ-NAPOCA
UNIVERSITATEA BABEŞ-B
TRADIŢIE ŞI EXCELENŢĂ
Facultatea de Ştiinţe Economice şi Gestiunea Afacerilor
Str. Teodor Mihali nr. 58-60
Cluj-Napoca, RO-400951
Tel.: 0264-41.86.52-5
Fax: 0264-41.25.70
econ@econ.ubbcluj.ro
www.econ.ubbcluj.ro

DETAILED SYLLABUS

Exploiting Organizational Data by Data and Process Mining

1. Information about the study program

1.1 University	Babeş-Bolyai University
1.2 Faculty	Faculty of Economics and Business Administration
1.3 Department	Business Information Systems
1.4 Field of study	Accounting
1.5 Program level (bachelor or master)	Master
1.6 Study program / Qualification	Accounting and Organizations

2. Information about the subject

2.1 Subject title	EME0630 Exploiting Organizational Data by) Data and Process Mining						
2.2 Course activities professor	Associate Professor Ph.D. RăzvanPetruşel						
2.3 Seminar activities professor	Associate Professor Ph.D. RăzvanPetruşel						
2.4 Year of study	II	2.5 Semester	3	2.6 Type of assessment	SE	2.7 Subject regime	EL.

3. Total estimated time (teaching hours per semester)

3.1 Number of hours per week	4	out of which: 3.2 course	1	3.3 seminar/laboratory	3
3.4 Total number of hours in the curriculum	56	out of which: 3.5 course	14	3.6 seminar/laboratory	42

Time distribution	Hours
Study based on textbook, course support, references and notes	28
Additional documentation in the library, through specialized databases and field activities	14
Preparing seminars/laboratories, essays, portfolios and reports	28
Tutoring	20
Assessment (examinations)	4
Others activities	

3.7 Total hours for individual study	94
3.8 Total hours per semester	150
3.9 Number of credits	6

4. Preconditions **(if necessary)**

4.1 Curriculum	NA
4.2 Skills	NA

5. Conditions (if necessary)

5.1. For course development	Attendance of students is mandatory for at least 70% of the courses;

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5.2. For seminar / laboratory development	• Management of course content, laboratory materials and project submissions is done exclusively by the dedicated course on the e-learning platform www.econ.ubbcluj.ro/moodle • Thea deadlines for project submissions is set by the teacher and is announced through the learning platform. • Submitting projects after the deadline will result in a deduction of at least 1 point per 24 hours of delay.

6. Acquired specific competences

Professional competences	• Competence in extracting information, models and insights from data available in the organization's IT systems, by applying techniques and algorithms of: • data mining such as: classification, association, regression, clustering and pattern discovery; • process mining such as: Alpha Miner, Fuzzy Miner and DPMN Miner; • Competence in checking if the current activities performed in the organization, as logged in the IT system, are in line with the processes prescribed by the management; • Competence in extending and improving business and decision processes in the company.
Transversal competences	• Ability to work in teams that implement complex projects on process modeling in order to extract insights from organizational data; • Ability to communicate knowledge (based on graphical models) as a business analyst or domain expert.

7. Subject objectives (arising from the acquired specific competences)

7.1 Subject's general objective	Enriching the student's theoretical knowledge and practical abilities to enable him to exploit data available in the organization's IT systems.
7.2 Specific objectives	Understanding activities that need to be performed in order to: - choose the best suited techniques to exploit data; - apply basic process mining techniques to automatically extract models of the processes actually performed by the company; - check the conformance of actual processes performed by the employees with the prescribed processes; - apply basic techniques to enhance organizational processes.

8. Contents

8.1 Course	Teaching methods	Observations
Introduction: Data, models, Extracting data from IT systems	Interactive presentation. Case study	1 course
Data mining techniques	Lecture, examples, case studies	2 courses
Techniques and algorithms for mining process models from data	Lecture, examples, case studies	2 courses
Checking the conformance of performed processes with prescribed processes, Enhancing real processes	Lecture, examples, case studies	1 course
Structured approach to implementing process mining projects	Case study	1 course
References: 1. van derAalst W.M.P.: Process Mining: Discovery, ConformanceandEnhancement of Business Processes, ed. Springer Verlag, 2011 2. Dumas, M., La Rosa, M., Mendling, J., Reijers, H.A.: Fundamentals of Business Process Management, ed. Springer, Berlin, 2013 3. Zaki, M. J., Wagner Meira Jr.: Data Mining andAnalysis: Fundamental ConceptsandAlgorithms, ed. Cambridge University Press, 2014.		
8.2 Seminar/laboratory	Teaching methods	Observations
Extracting and pre-processing data from various IT systems	Examples, case studies	2 labs
Analyzing data by data-mining techniques	Examples, case studies	2 labs
Analyzing data by process-mining techniques	Examples, case studies	3 labs
Analyzing conformance of mined process with prescribed processes	Examples, case studies	3 labs

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Enhancing organization's processes	Examples, case studies	2 labs
Applying a process mining structured approach	Case study	2 labs

References:
1. van derAalst W.M.P.: Process Mining: Discovery, ConformanceandEnhancement of Business Processes, ed. Springer Verlag, 2011
2. Dumas, M., La Rosa, M., Mendling, J., Reijers, H.A.: Fundamentals of Business Process Management, ed. Springer, Berlin, 2013
3. Zaki, M. J., Wagner Meira Jr.: Data Mining andAnalysis: Fundamental ConceptsandAlgorithms, ed. Cambridge University Press, 2014.
Instrumente software:
4. Weka data-mining: http://sourceforge.net/projects/weka/
5. ProM Framework: http://www.promtools.org/doku.php
6. Disco: http://www.fluxicon.com/

9. Corroboration / validation of the subject's content in relation to the expectations coming from representatives of the epistemic community, of the professional associations and of the representative employers in the program's field.

•The content of the course is aligned with similar courses from the Technical University of Eindhoven and from the WirtschaftsuniversitatViena. Professor Jan Mendling from WirtschaftsuniversitatViena will teach several courses.
• To promote potential impact on real organizations, we will invite at least one professional involved in a process modeling and data mining project in an industrial setting.

10. Assessment (examination)

Type of activity	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Knowledge of data mining techniques Knowledge on process mining algorithms and techniques Knowledge of the necessary activities to implement a process-mining project	Written exam with: - multiple-choice questions; - problem introducing a situation that requires data analyze by data-mining and/or process-mining techniques	30%
10.5 Seminar/laboratory	Apply data mining techniques such as: clustering, decision tree extraction, or association rules extraction from a data set Apply process mining techniques such as Alpha Miner, Fuzzy Miner as well as interactive process model visualization Enhancing a process starting from a real execution log and a prescribed process model	Project 1: - analyzing by data-mining a data set provided by the professor Project 2: - analize by process-mining a data set storing process execution data, provided by the professor; - check conformity of a prescribed model with the process execution data set; Enhancing prescribed model based on the conformity check; Bonus project: - implementing a process mining project in a real organization	30% 40%

10.6 Minimum performance standard

- It is necessary to obtain a minimum grade of 5 (five) in order to pass this subject;
- The grades being granted are between 1 (one) and 10 (ten);
- Students must approach each component of the final grade;
- The exam is written and takes approximately 60 minutes;
- For passing the exam, the student must, at least, be able to:
  - manually extract a process model from a small example data set;
  - use tools like ProM Framework and Weka to extract knowledge and insights from a provided data set.

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