SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**"Babes_Bolyai" University**
1.2 Faculty	**Faculty of Mathematics and Computer science**
1.3 Department	**Department of Computer Science**
1.4 Field of study	**Informatics(Computer Science)**
1.5 Study cycle	**Master**
1.6 Study programme / Qualification	**Databases**

2. Information regarding the discipline

2.1 Name of the discipline	**Workflow Systems**						
2.2 Course coordinator	**Assoc.Prof.PhD. Niculescu Virginia**						
2.3 Seminar coordinator	**Assoc.Prof.PhD. Niculescu Virginia**						
2.4. Year of study	**2**	2.5 Semester	**3**	2.6. Type of evaluation	**C.**	2.7 Type of discipline	**Optional**

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	3	Of which: 3.2 course	2	3.3 seminar/laboratory	1 sem.
3.4 Total hours in the curriculum	42	Of which: 3.5 course	28	3.6 seminar/laboratory	14
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					20
Additional documentation (in libraries, on electronic platforms, field documentation)					10
Preparation for seminars/labs, homework, papers, portfolios and essays					23
Tutorship					7
Evaluations					20
Other activities:					-

3.7 Total individual study hours	80
3.8 Total hours per semester	150
3.9 Number of ECTS credits	6

4. Prerequisites (if necessary)

4.1. curriculum	• Algorithmics, Fundamentals of Programming
4.2. competencies	• Programming skills and basic abilities for dealing with abstractions

5. Conditions (if necessary)

5.1. for the course	• projector
5.2. for the seminar	• projector

6. Specific competencies acquired

Professional competencies	• Each student has to prove that (s)he acquired an acceptable level of knowledge and understanding of the subject, that (s)he is capable of stating these knowledge in a coherent form, that (s)he has correct habits of analysis, design of problems related to workflow systems.
Transversal competencies	• Ability to use a workflow system tool in order to define and implement a business process.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• To introduce the notions of 'workflow', and workflow system. • To analyze several workflow case studies in order to emphasize the advantages of automated workflow.
7.2 Specific objective of the discipline	• To emphasize the relation between workflow technology and business processes management • To present the workflow reference model. • To presents the most important workflow patterns. • To present several concrete solutions for workflow modeling.

8. Content

8.1 **Course**	Teaching methods	Remarks
1. Introduction**.** o Terminology. o Definitions. o Workflow concept evolution o Primitive elements: object, task, transfer, resource, attribute, rule, route	Exposure: description, explanation, examples, discussion of case studies	
2. Workflow classifications: Workflow basic building block structures o Sequential o Forked o Iterative o Asynchronous	Exposure: description, explanation, examples, discussion of case studies	

3. The workflow reference model [6] o Workflow Reference Model Diagram o Workflow Enactment Services o Process Definition o Workflow Client Functions o Invoked Application Functions o Workflow Interoperability o System Administration & Monitoring o WAPI Structure, Protocol, and Conformance	Exposure: description, explanation, examples, discussion of case studies	
4. Workflow systems modeling Activity diagrams [7]	Exposure: description, explanation, examples, discussion of case studies	
5. Workflow systems modeling Petri nets [1,9]	Exposure: description, explanation, examples, discussion of case studies	
6. Business Process Management [4, 5] o Business Process Modeling Notation (BPMN) o Business Process Execution Language (BPML)	Exposure: description, explanation, examples, discussion of case studies	
7. Workflow patterns [2] o Basic Control Patterns o Advanced Branching and Synchronization Patterns	Exposure: description, explanation, examples, discussion of case studies	
8. Workflow patterns [2] o Structural Patterns o Multiple Instances (MI) o	Exposure: description, explanation, examples, discussion of case studies	
9. Workflow patterns [2] o State-based patterns o Cancellation Patterns o	Exposure: description, explanation, examples, discussion of case studies	
10. WS –management of the resource allocation	Exposure: description, explanation,	

+patterns for resource allocation ○	examples, discussion of case studies	
11. (Re)designing workflows-Business Process Reengineering (BPR)	Exposure: description, explanation, examples, discussion of case studies	
12. Orchestration vs Choreography Dataflow modeling	Exposure: description, explanation, examples, discussion of case studies	
13. Workflows for scientific applications	Exposure: description, explanation, examples, discussion of case studies	
14. Case studies	Exposure: description, explanation, examples, discussion of case studies	

http://www.cs.ubbcluj.ro/~vniculescu/didactic/

Bibliography

1. Wil van der Aalst, Kees van Hee: *Workflow Management: Models, Methods, and Systems*, MIT Press, 2002, ISBN: 0-262-01189-1
2. Wil van Der Aalst, Hofstede, Arthur H.M.; Kiepuszewski, Bartek; Barros, Alistair P. (2003). "Workflow Patterns". *Distributed and Parallel Databases* **14**: 5--51.
3. Layna Fischer: *Workflow Handbook 2005*, Future Strategies, ISBN 0-9703509-8-8
4. BPMN Specification *http://www.bpmn.org/*
5. *Stephen A. White,* Introduction to BPMN - *IBM May 2004*
6. Workflow Reference Model http://www.wfmc.org/standards/referencemodel.htm
7. UML specification, http://www.omg.org/technology/documents/formal/uml.htm
8. Peterson, James L. (1977). "Petri Nets". *ACM Computing Surveys* **9** (3): 223–252.

T. Murata, Petri Nets: Properties, Analysis and Applications Proceedings of the IEEE, Vol. 77, No 4, April, 1989, pp. 541-580.

. 9. Barker and J. van Hemert. Scientific Workflow: A Survey and Research Directions. Seventh International Conference on Parallel Processing and Applied Mathematics, Revised Selected Papers, volume 4967 of LNCS, pages 746- 753. Springer, 2008.

8.2 Seminar	Teaching methods	Remarks

1. UML activity diagrams - examples	Explanation, dialogue, case studies	The seminar is structured as 2 hours classes every second week
2. Petri Nets -examples	Dialogue, debate, case studies, examples, proofs	
3. BPMN -examples	Dialogue, debate, case studies, examples, proofs	
4. Workflow patterns – analysis, examples and discussions	Dialogue, debate, explanation, examples	
5. Student presentations	Dialogue, debate, explanation, examples	
6. Student presentations	Dialogue, debate, explanation, examples	
7. Student presentations	Dialogue, debate, explanation, examples	

Bibliography

1. Wil van der Aalst and Kees van Hee, Workflow Management, MIT Press 2004.
2. Howard Smith and Peter Fingan, Business Process Management - the third wave, Meghan-Kiffer Press 2003.
3. Hajo A. Reijers, Design and Control of Workflow Processes, Springer Publishers 2003.

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The course respects the IEEE and ACM Curricula Recommendations for Computer Science studies;
- The course exists in the studying program of all major universities in Romania and abroad;

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	- know the basic principles and paradigms of the domain;	Presentations, Questions while the research paper is presented.	20%

10.5 Seminar	- research paper (*referat*) that presents a workflow system management tool.	-presentation -discussion	80%
10.6 Minimum performance standards			
➢ At least grade 5 (from a scale of 1 to 10) for the final grade.			

Date ....1.04.2014.....

Signature of course coordinator .....Niculescu Virginia.....

Signature of seminar coordinator .....Niculescu Virginia

Date of approval .....

Signature of the head of department .....….....