

SYLLABUS / FIȘA DISCIPLINEI
1. Information on the study programme / Date despre programul de studii

1.1. Institution / Instituția de învățământ superior	Universitatea de Vest din Timișoara
1.2. Faculty / Facultatea	Matematică și Informatică
1.3. Department / Departamentul	Computer Science (Informatică)
1.4. Study program field	Computer Science (Informatică)
1.5. Study cycle/ Ciclul de studii	MSc / master
1.6. Study programme / Programul de studii / calificarea*	Artificial Intelligence and Distributed Computing

2. Information on the course / Date despre disciplină

2.1. Title of the course / Denumirea disciplinei	Term Rewriting						
2.2. Teacher in charge of the course / Titularul activităților de curs	Conf. Dr. Adrian Crăciun						
2.3. Teacher in charge of the seminar / Titularul activităților de seminar	Conf. Dr. Adrian Crăciun						
2.4. Study year / Anul de studii	1	2.5. Semester / Semestrul	2	2.6. Examination type / Tipul de evaluare: E(xam)/C(olloquim)	E	2.7. Course type / Regimul disciplinei: M(andatory)/ E(lective)/ F(acultative)	M

3. Estimated study time (number of hours per semester) /Timpul total estimat (ore pe semestru al activităților didactice)

3.1. Attendance hours per week / Număr de ore pe săptămână	3	out of which din care: 3.2 lecture/ curs	2	3.3. seminar/laborator	1
3.4. Attendance hours per semester / Total ore din planul de învățământ	42	out of which: 3.5 lecture / curs	28	3.6. seminar/laborator	14
Distribution of the allocated amount of time / Distribuția fondului de timp*					hours/ ore
Individual study /Studiu după manual, suport de curs, bibliografie și notițe					28
Supplementary documentation at library or using electronic repositories / Documentare suplimentară în bibliotecă, pe platformele electronice de specialitate					14
Preparing for laboratories, homework, reports etc. /Pregătire seminarii/laboratoare, teme, referate, portofolii și eseuri					38
Exams / Examinări					4
Tutoring / Tutorat					14
3.7. Total number of hours of individual study / Total ore studiu individual	98				
3.8. Total number of hours per semester / Total ore pe semestru	140				

3.9. Number of credits (ECTS) /6	
Număr de credite	

4. Prerequisites (if it is the case) / Precondiții (acolo unde e cazul)

4.1. curriculum / de curriculum	Logic, Programming, Algorithmics, Formal languages, Algebra
4.2. skills / de competențe	Programming, capacity for individual and team work.

5. Requirements (if it is the case) / Condiții (acolo unde e cazul)

5.1. for the lecture / de desfășurare a cursului	Whiteboard/Online (to be determined)
5.2. for the seminar, laboratory / de desfășurare a seminarului/laboratorului	Whiteboard/Online (to be determined), computers, popular compilers/interpreters: C, C++, Java, Python, appropriate editors.

6. Acquired skills / Competențe specifice acumulate

Professional skills / Competențe profesionale	<p>Cognitive: Understand the theoretical foundations of term rewriting, its role as a general framework in computing, its limitations and approaches to overcome these limitations where possible.</p> <p>Technical: Perform operations on terms (substitutions, unification). Define simplification orders for identities, orient identities into rules, compute critical pairs and apply completion procedures. Also, implement the mentioned operations.</p> <p>Affective cognitive: Understand rewriting as a general framework underlying many formalisms in computer science.</p>
Transversal skills / Competențe transversale	Identify situations in which rewriting can play a role in problem solving and apply it.

7. Objectives of the course / Obiectivele disciplinei (reieșind din grila competențelor specifice acumulate)

7.1. General objective / Obiectivul general al disciplinei	Introduce the theoretical foundations of term rewriting while presenting it as a general framework for various aspects of computing.
7.2. Specific objectives / Obiectivele specifice	<p>Knowledge: Describe terms and operation on terms. Describe abstract reduction systems.</p> <p>Abilities: Manipulate terms, orient rules, complete rule systems. Implement term operations, termination, completion.</p> <p>Aptitudes: Identify situations where term rewriting systems can be employed.</p>

8. Content / Conținuturi*

8.1. Lecture / Curs	Teaching strategies / Metode de predare	Remarks, details / Observații
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L1. Motivation. Introductory examples. Abstract rewriting systems (I): Equivalence and reduction.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L2. Abstract rewriting systems (II): The Church Rosser property. Confluence. Well Founded Induction.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L3. Abstract rewriting systems (III): Termination orderings. Multiset orderings.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L4. Terms. Substitutions. Identities.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L5. Equational problems. Unification of terms.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L6. Termination. Termination orderings. Simplification orderings. Recursive path orderings. Knuth-Bendix orderings.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L7. Confluence. Critical pairs.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L8. Completion. The basic completion procedure. Implementation issues	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L9. Huet's completion procedure.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L10. Other CPC algorithms: First order resolution.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L11. Other CPC algorithms: Groebner Bases (I)	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L12. Other CPC algorithms: Groebner Bases (II)	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/

L13. Implementation revisited.	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/
L14. Summary of the lecture, review of material	Q&A/Lecture/Dialogue	Lecture materials available at http://staff.fmi.uvt.ro/~adrian.craciun/

Recommended bibliography / Bibliografie

Franz Baader, Tobias Nipkow. *Term Rewriting and All That*. Cambridge University Press. 1998.

Bruno Buchberger. History and Basic Features of the Critical-Pair/Completion Procedure. *Journal of Symbolic Computation* 3(1/2), pp. 3-38. 1987.

Alan Robinson and Andrei Voronkov. *The Handbook of Automated Reasoning*. Elsevier and MIT Press. 2001.

8.2. Seminar, lab / Seminar, laborator	Teaching/learning strategies / Metode de predare/ învățare	Remarks, details / Observații
Lab 1-7. Implementation of concepts introduced in the lectures: terms, term operations, rewriting systems.	Experiment, discussion, team work.	

Recommended bibliography / Bibliografie

Terese. *Term Rewriting Systems*. Cambridge University Press, 2003.

9. Correlations between the content of the course and the requirements of the IT field / Coroborarea conținuturilor disciplinei cu așteptările reprezentanților comunității epistemice, asociațiilor profesionale și angajatorilor reprezentativi din domeniul aferent programului

The content of the lecture is similar to similar standard lectures in well known and established universities.

10. Evaluation / Evaluare*

Activity / Tip de activitate	10.1. Evaluation criteria / Criterii de evaluare**	10.2. Evaluation methods / Metode de evaluare***	10.3. Weight in the averaged mark / Pondere din nota finală

10.4. Lecture / Curs	10: excellent (outstanding performance with only minor errors), 8-9: very good (above the average standard but with some errors), 6-7: satisfactory (fair, but with significant shortcomings), 5: sufficient (performance meets minimum criteria), 0-4: fail (significant work has to be done)	Oral exam.	70%
10.5. Seminar/ lab	Implementation of a Critical Pair / Completion Algorithm	Project presentation	30%
10.6. Minimal knowledge for passing / Standard minim de performanță			
Basic knowledge of the concepts presented in the lecture: explain and apply. Minimal knowledge is measured by reaching the grade for passing the exam (5).			

Date/ Data completării

Signature (lecture) /
Semnătura titularului de curs

Signature (seminar)
Semnătura titularului de seminar

Signature (director of the department)
Semnătura directorului de departament