

# Curriculum Vitae

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## Education

Habilitation in Mathematics, TU Darmstadt, 2008.

Thesis: *Simple Monadic Theories*

PhD in Mathematics, RWTH Aachen, 2003.

Thesis: *Structures of Bounded Partition Width*.

Advisor: Prof. Erich Grädel

Diploma in Computer Science, RWTH Aachen, 1999.

Thesis: *Automatic Structures*.

Advisor: Prof. Erich Grädel

## Employment

- since 2005 Assistant position at TU Darmstadt  
(towards habilitation, which was completed December 2008)
- 2004 Postdoc position at Université Bordeaux 1
- 2000–2003 PhD student position at RWTH Aachen
- 1997–1999 various occupations as tutor or teaching assistant

## Research Projects and Grants

- 2008 *Algebraic Characterisations of Regular  $\omega$ -Tree Languages*,  
ESF AutoMathA – Short Visit Grant (principal researcher).
- 2004 *Games and Automata for Synthesis and Validation*,  
EU Research and Training Network (post-doctoral research assistant).
- 2000–2003 *Computational Model Theory*, Deutsche Forschungsgemeinschaft (DFG),  
RWTH Aachen (research assistant; principal researcher: Prof. Erich Grädel).

## Research Interests

- (a) Computational and algorithmic model theory, finite model theory.
- (b) Model theory for monadic second-order logic.
- (c) Automata theory and algebraic language theory.
- (d) Graph theory and combinatorics.
- (e) Model checking and verification, decision procedures for fixed-point logics and fragments of second-order logic.

## Teaching Experience

For the last eight years I have been responsible for tutorials, exercises, and seminars, mostly on mathematical logic and its applications in computer science and on linear algebra. In addition I taught some courses of my own:

summer term 2003	Model Theory
summer term 2005	The Monadic Second-Order Theory of Graphs
winter term 2007/2008	Non-Classical Model Theory
winter term 2008/2009	Graph Theory
summer term 2009	Formal Foundations of Computer Science 1

The last one is an undergraduate course, while the others are advanced courses. As is typically the case in the German system, these lecture courses were individually and independently developed.

## Publications

### Unpublished papers

- [U1] *Logic and Algebra*, book in preparation. A draft is available at [www.mathematik.tu-darmstadt.de/~blumensath](http://www.mathematik.tu-darmstadt.de/~blumensath)
- [U2] *Recognisability for Algebras of Infinite Trees*, submitted.
- [U3] *Simple Monadic Theories and Indiscernibles*, submitted.
- [U4] *Simple Monadic Theories and Partition Width*, submitted.
- [U5] *Locality and Modular Ehrenfeucht-Fraïssé Games*, submitted.

### Journal articles

- [J1] *Guarded Second-Order Logic, Spanning Trees, and Network Flows*, Logical Methods in Computer Science, to appear.
- [J2] (with Bruno Courcelle) *The Monadic Second-Order Transduction Hierarchy*, Logical Methods in Computer Science, to appear.
- [J3] *On the Structure of Graphs in the Caucal Hierarchy*, Theoretical Computer Science, 400 (2008), pp. 19–45.
- [J4] (with Bruno Courcelle) *Recognizability, Hypergraph Operations, and Logical Types*, Information and Computation, 204 (2006), pp. 853–919.
- [J5] *A Model Theoretic Characterisation of Clique-Width*, Annals of Pure and Applied Logic, 142 (2006), pp. 321–350.
- [J6] (with Stephan Kreutzer) *An Extension to Muchnik’s Theorem*, Journal of Logic and Computation, 15 (2005), pp. 59–74.
- [J7] (with Erich Grädel) *Finite Presentations of Infinite Structures: Automata and Interpretations*, Theory of Computing Systems, 37 (2004), pp. 641–674.
- [J8] *Axiomatising tree-interpretable structures*, Theory of Computing Systems, 37 (2004), pp. 3–27.

### Handbook chapters

- [H1] (with Thomas Colcombet and Christof Löding) *Logical theories and compatible operations*, in Logic and Automata (J. Flum, E. Grädel, T. Wilke, eds.), Amsterdam University Press, 2007, pp. 72–106.
- [H2] (with Dietmar Berwanger) *The Monadic Theory of Tree-like Structures*, in Automata, Logic, and Infinite Games (E. Grädel, W. Thomas, T. Wilke, eds.), LNCS 2500 (2002), pp. 285–301.
- [H3] (with Dietmar Berwanger) *Automata for Guarded Fixed Point Logics*, in Automata, Logic, and Infinite Games (E. Grädel, W. Thomas, T. Wilke, eds.), LNCS 2500 (2002), pp. 343–355.

## Papers in refereed conferences

- [C1] (mit Martin Otto und Mark Weyer) *Boundedness of Monadic Second-Order Formulae Over Finite Words*, ICALP, LNCS 5556 (2009), S. 67–78.
- [C2] (with Erich Grädel) *Finite Presentations of Infinite Structures: Automata and Interpretations*, Proc. 2nd Int. Workshop on Complexity in Automated Deduction, CiAD 2002.
- [C3] *Axiomatising tree-interpretable structures*, Proc. 19th Int. Symp. on Theoretical Aspects of Computer Science, LNCS 2285 (2002), pp. 596–607.
- [C4] *Bounded Arithmetic and Descriptive Complexity*, Proc. 14th Ann. Conference of the European Association for Computer Science Logic, LNCS 1862 (2000), pp. 232–246.
- [C5] (with Erich Grädel) *Automatic Structures*, Proc. 15th IEEE Symp. on Logic in Computer Science, 2000, pp. 51–62.

## Theses

- [T1] *Simple Monadic Theories*, Habilitation Thesis, TU Darmstadt, 2008.
- [T2] *Structures of Bounded Partition Width*, Ph.D. Thesis, RWTH Aachen, 2003.
- [T3] *Automatic Structures*, Diploma Thesis, RWTH Aachen, 1999.

Preprints of all my papers are available from:

<http://www.mathematik.tu-darmstadt.de/~blumensath/Publications.html>

## Invited Talks

### Invited talks at conferences and workshops

- [1] *Automata, Logic, and Infinite Games*, Dagstuhl, 2001.
- [2] *Workshop on Automata, Structures and Logic*, Auckland, 2004.
- [3] *Finitely Represented Infinite Graphs*, Rennes, 2005.
- [4] *Logic and Combinatorics*, Szeged, 2006.
- [5] *Algorithmic-Logical Theory of Infinite Structures*, Dagstuhl, 2007.
- [6] *Logic and Algorithms*, Edinburgh, 2008.
- [7] *ASL Winter Meeting, Special Session on Model Theoretic Methods in Finite Combinatorics*, Washington, 2009.

### Invited lectures and stays at universities

- [1] University of Dresden, 2003.
- [2] University of Paris 7, 2008.
- [3] RWTH Aachen, 2008.
- [4] Université Bordeaux 1, 2009.

## Other academic engagements and activities

I am currently serving for the second time as an accountant for the EACSL.

I act as referee for journals and conferences, as illustrated by the (incomplete) listings below.

*Refereeing for journals:* Journal of Symbolic Logic, Logical Methods in Computer Science, ACM Transactions on Computational Logic, Discrete Mathematics, Discrete Applied Mathematics, Information and Computation, Transactions on Database Systems, Fundamenta Informaticae, Theoretical Computer Science.

*Refereeing for conferences:* Logic in Computer Science LICS, Computer Science Logic CSL, International Colloquium on Automata, Languages and Programming ICALP, Foundations of Software Technology and Theoretical Computer Science FSTTCS, Symposium on Theoretical Aspects of Computer Science STACS.