# Curriculum Vitae

Dieter Spreen

Born: 18 January 1947 in Düsseldorf, Germany
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## Address

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## Higher Education

- Habilitation in computer science, University of Technology Aachen, 1985.
- Ph.D. in computer science (**Summa cum Laude**), University of Technology Braunschweig, 1977.
- Diplom in mathematics, University of Cologne, 1973.

## Experience

### Positions Held

- Since 2012: Emeritus Professor, University of Siegen.
- 2005–2012: Professor for Mathematical Logic and Theoretical Computer Science, University of Siegen.
- 2004–2005: Professor of Mathematics, University of Cape Town, South Africa.
- 1988–2004: Professor for Theoretical Computer Science, University of Siegen.
- 1985–1988: Software engineer, SIEMENS Laboratories for Research and Development, Munich.
- 1985: Professore a contratto: University of Salerno, Italy.
- 1984–1985: Research Fellow, German Science Foundation.

- 1979–1984: Scientific Collaborator, Lehrstuhl für Informatik I, University of Technology Aachen.
- 1972–1979: Scientific Assistant, Lehrstuhl B für Informatik, University of Technology Braunschweig.

### Other Positions

- 2013/14: Visiting Research Professor, University of South Africa, Pretoria.
- 2009: Adjunct Professor, Nanyang Technological University, Singapore.
- 2008: Visiting Professor, Kyoto University, Japan.
- 2008: Visiting Professor, Swansea University, UK.
- 2003: Adjunct Professor, University of Padua, Italy
- 2002/03: Visiting Academic, University of Canterbury, New Zealand.
- 1997: Research Fellow (Heinrich-Hertz-Foundation), University Paris 6, France.
- 1997: Visiting Professor, University Paris 6, France.
- 1990/08: Lecturer in summer school, University of Perugia, Italy.
- 1988: Adjunct Professor, University of Technology Aachen.
- 1986/87: Research Fellow (Consiglio Nazionale delle Ricerche), University of Pisa, Italy.
- 1986/87: Adjunct Professor, German Open University, Hagen
- 1985/86: Adjunct Professor, German Open University, Hagen
- 1984/85: Adjunct Professor, German Open University, Hagen.
- 1984: Adjunct Professor, University of Dortmund.

## Research

Publications in the areas of Markovian decision processes, Markovian renewal programming, theory of stochastic matrices, automata theory, computability and complexity theory, computable analysis, domain theory, lambda calculus and type theory.

## Publications

### Refereed Journal Articles

Effectivity and effective continuity of multifunctions. *The Journal of Symbolic Logic* 75, 602–640 (2010).

A construction method for partial metrics. *Topology Proceedings* 33, 41–54 (2009).

Information systems revisited: The general continuous case. *Theoretical Computer Science* 405, 176–187 (2008). (Jointly with L. Xu and X. Mao.)

Strong reducibilities for partial numberings. *Archive for Mathematical Logic* 44, 209–217 (2005).

A note on partial numberings. *Mathematical Logic Quarterly* 51, 129–136 (2005). (Jointly with S. Badaev.)

The largest Cartesian closed category of domains, considered constructively. *Mathematical Structures in Computer Science* 15, 299–321 (2005).

Safe weak minimization revisited. *SIAM Journal of Computing* 31, 1542–1556 (2002).

Representations versus numberings: on two computability notions. *Theoretical Computer Science* 262, 473–499 (2001).

Can partial indexings be totalized? *The Journal of Symbolic Logic* 66, 1157–1185 (2001).

On domains witnessing increase in information. *Applied General Topology* 1, 129–152 (2000) (**invited paper**).

On functions preserving levels of approximation: a refined model construction for various lambda calculi. *Theoretical Computer Science* 212, 261–303 (1999); Corrigendum 266, 997–998 (2001).

On effective topological spaces, *The Journal of Symbolic Logic* 63, 185–221 (1998); Corrigendum 65, 1917–1918 (2000).

Effective inseparability in a topological setting. *Annals of Pure and Applied Logic* 80, 257–275(1996).

On some decision problems in programming. *Information and Computation* 122, 120–139(1995); Corrigendum 148, 241–244 (1999).

Computable one-to-one enumerations of effective domains. *Information and Computation* 84, 26–46 (1990).

On the equivalence problem in automata theory: A uniform approach. *J. of Information Processing and Cybernetics EIK* 24, 31–50(1988).

On some properties of the Cesaro limit of a stochastic matrix. *Lin. Alg. Appl.* 41, 81–91(1981).

A further anticycling rule in multichain policy iteration for undiscounted Markov renewal programming. *Zeitschr. f. Oper. Res.* 25, 225–233 (1981).

A new specification of the multichain policy iteration algorithm in undiscounted Markov renewal programs. *Management Sci.* 26, 1211–1217 (1980). (Jointly with A. Federgruen.)

## Book Contribution (refereed)

The life and work of Victor L. Selivanov. In: V. Brattka et al., eds., *Logic, Computation, Hierarchies* (Festschrift in honour of Victor L. Selivanov). De Gruyter, Berlin, Boston, 2014, pp. 1–8.

Partial numberings and precompeteness. In: V. Brattka et al., eds., *Logic, Computation, Hierarchies* (Festschrift in honour of Victor L. Selivanov). De Gruyter, Berlin, Boston, 2014, pp. 325–340.

An isomorphism theorem for partial numberings. In: V. Brattka et al., eds., *Logic, Computation, Hierarchies* (Festschrift in honour of Victor L. Selivanov). De Gruyter, Berlin, Boston, 2014, pp. 341–481.

Representing L-domains as information systems. In: U. Berger et al., eds., *Logic, Construction, Computation* (Festschrift for Helmut Schwichtenberg). Ontos Verlag, Frankfurt/Main, 2012, pp. 501–540.

## Conference Publications (all refereed)

Every $\Delta^0_2$-set is natural, up to Turing equivalence. In *CiE 2010* (F. Ferreira et al., eds.), 386–393. Lec. Notes in Computer Science 6158. Springer, Berlin 2010.

On the continuity of effective multifunctions. *Electronic Notes in Theoretical Computer Science* 221, 271–286 (2008).

On some problems in computable topology. In *Logic Colloquium '05* (Dimitracopoulos, C. et al., eds.), 221–254. Cambridge University Press, Cambridge, 2008.

A note on strongly finite sequent structures. In *Domain Theory, Logic and Computation* (Zhang, G.-Q. et al.), eds., 179–196. Kluwer, Dordrecht, 2003. (Jointly with R. Greb.)

On the equivalence of some approaches to computability on the real line. In *Domains and Processes* (Keimel, K. et al., eds.), 67–101. Kluwer, Dordrecht, 2001. (Jointly with H. Schulz. )

A new model construction for the polymorphic lambda calculus. In *Logic for Programming and Automated Reasoning, 7th Intern. Conf., LPAR 2000, Réunion Island, France, November 2000, Proc.* (Parigot, M. et al., eds.), 275–292. Lec. Notes Artificial Intelligence 1955. Springer, Berlin 2000.

Representations versus numberings: on two computability notions. In *Combinatoris, Complexity, & Logic* (Bridges, D.S. et al., eds), 387–401. Springer, Singapore, 1997.

Effective operators and continuity revisited. In *Proc. Symposium on Logical Foundations of Computer Sience, Tver 1992* (Nerode, A. et al., eds.), 459–469. Lec. Notes Comp. Sci. 620. Springer, Berlin 1992.

A characterization of effective topological spaces II. In *Topology and Category Theory in Computer Science* (Reed, G.M. et al., eds.), 231–255. Oxford University Press, Oxford 1991.

A characterization of effective topological spaces. In *Recursion Theory Week, Proc., Oberwolfach 1989* (Ambos-Spies, K. et al., eds.), 363–388. Lec. Notes Math. 1432. Springer, Berlin 1990.

On functions computable in nondeterministic polynomial time: some characterizations. In *CSL '87, Proc. 1st Workshop on Computer Science Logic, Karlsruhe, FRG, 1987* (Börger, E. et al., ed.), 289–303. Lec. Notes Comp. Sci. 329. Springer, Berlin 1988.

Computable one-to-one enumerations of effective domains. In *Mathematical Foundations of Programming Language Semantics* (Main, M. et al., eds.), 372–384. Lec. Notes Comp. Sci. 298. Springer, Berlin 1988.

On the power of single-valued nondeterministic polynomial time computations. In *Computation Theory and Logic* (Börger, E., ed.), 403–414. Lec. Notes Comp. Sci. 270. Springer, Berlin 1987. (Jointly with H. Stahl.)

On the equivalence problem in automata theory: a unified approach. In *Algebra, Combinatorics and Logic in Computer Science* (Demetrovics, J. et al., eds.), 731–743. North-Holland, Amsterdam 1985.

Effective operators in a topological setting. In *Computation and Proof Theory, Proc. Logic Colloquium Aachen 1983, Part II* (Richter, M.M. et al., eds.), 437–451. Lec. Notes Math. 1104. Springer, Berlin 1984. (Jointly with P. Young.)

On r.e. inseparability of cpo index sets. In *Logic and Machines: Decision Problems and Complexity* (Börger, E. et al., eds.), 103–117. Lec. Notes Comp. Sci. 171. Springer, Berlin 1984.

Reducing the computational complexity of the multichain policy iteration algorithm in undiscounted Markov renewal programming. In *Proc. 6. Symposium über Operations Research, Augsburg 1981, Part II: Sections 4–6* (Bamberg, G. und O. Opitz, eds.), 203–211. Methods of Operations Research 44. Hain, Königstein/Ts., 1981.

On minimizing the states of a Markovian decision process. In *Proc. IXth Oberwolfach Conference on Operations Research, 1978* (Henn, R. et al., eds.), 305–319. Methods of Operations Research 36. Hain, Königstein/Ts., 1980.

### Other Publications

*Computability Theory on Subsets of Partial Functions.* 194 p. Habilitation thesis. U Aachen, 1985.

*An Automata-Theoretic Contribution to the Theory of Undiscounted Markovian Decision Processes.* 182 p. PhD thesis. U Braunschweig, 1977.

## Invited Speaker

Invited Lectures at the Logic Colloquium, the International Symposium on Domain Theory and several other conferences. Seminar talks at numerous universities, national and international.

## Research Grants

- 2014–2017: Local coordinator of international project *Correctness by Construction* with participation of 21 research groups from Australia, Germany, India, Italy, Japan, South Korea, New Zealand, Sweden, UK, and the USA, mainly funded by the European Union.
- 2012–2016: Coordinator of international project *Computable Analysis* with participation of 11 research groups from Germany, Japan, Russia, Slovenia, South Africa and the UK, mainly funded by European Union.
- 2008–2011: German coordinator of German-Chinese project *Computability and Complexity in Analysis: Towards a Sound Foundation for Scientific Computations* with participation of 11 different research groups, funded by German Research Foundation and National Natural Science Foundation of China.
- 2007–2011: German coordinator of German-South African project *From Continuity to Computability* with participation of 7 different research groups, funded by German Research Foundation and South African National Research Foundation.
- 2005–2011: German coordinator of German-Russian project *Computability on Non-discrete Structures: Models, Semantics and Complexity* with participation of 6 different research groups, funded by German Research Foundation and Russian Foundation for Basic Research.
- 2006–2007: Project *Effectivity in Continuous Data Structures, particularly Hybrid Systems*, 1 position, funded by Heinrich Hertz Foundation.
- 2005–2007: Research cooperation with V. Selivanov *Computability and Complexity in Topology and Domain Theory*, funded by German Academic Exchange Service.
- 2004–2007: Participation in German-Chinese project *Foundations of Numerical Computation*, funded by German Research Foundation and National Natural Science Foundation of China.
- 2001–2004: German coordinator of German-Russian project *Domain-like Structures for Semantics and Computability*, funded by German Research Foundation and Russian Foundation for Basic Research.
- 2002: Project on *Optimal Domains*, 1 post-doc position, funded by Heinrich Hertz Foundation.
- 2001–2004: Participation in INTAS project *Computability in Hierarchies and Topological Spaces*.
- 2001–2002: Investigator, *The Development of Programming Languages that Support Efficient Design*, funded by Enterprise Ireland.
- 1989–1996: Participation in ESPRIT Basic Research Actions, WG *Common Foundations of Functional and Logic Programming*.

## Editorship

V. Brattka, H. Diener, D. Spreen, *Logic, Computation, Hierarchies* (Festschrift in honour of Victor L. Selivanov). Ontos Mathematical Logic 4, De Gruyter, Berlin, Boston, 2014.

H. Ishihara, M. Korovina, A. Pauly, M. Seisenberger, D. Spreen, Continuity, Computability, Constructivity: From Logic to Algorithms, Gregynog, Wales, 2013. *Mathematical Structures in Computer Science*, under preparation.

D. Spreen, U. Berger, V. Brattka, V. Selivanov, H. Tsuiki, Computing with Infinite Data: Logical and Topological Foundations. *Mathematical Structures in Computer Science*, 25 (2), 2015.

U. Berger, V. Brattka, A. Morozov, D. Spreen, Continuity, Computability, Constructivity: From Logic to Algorithms, Cologne, 2009. *Annals of Pure and Applied Logic*, 163 (8), 2012.

R. Kopperman, P. Panangaden, M.B. Smyth, D. Spreen, Computational Structures for Modeling Space, Time and Causality. *Theoretical Computer Science*, 405 (1-2), 2008.

R. Kopperman, P. Panangaden, M.B. Smyth, D. Spreen. J. Webster, Spatial Representation: Discrete vs. Continuous Computational Models. *Theoretical Computer Science*, 365 (3), 2006.

J. Frith, D. Holgate, D. Spreen, Proceedings of the 19th Summer Topology Conference on General Topology and Its Applications, Cape Town, 2004. *Topology Proceedings*, 29 (2), 2005.

M. Schellekens, A. Seda, D. Spreen, Mathematical Foundations of Computer Science and IT in Ireland. *Applied Categorical Structures*, 11 (1-2), 2003.

R. Kopperman, M.B. Smyth, D. Spreen, Topology in Computer Science. *Theoretical Computer Science*, 305 (1-3), 2003.

D. Spreen, Workshop on Domains IV. *Electronic Notes in Theoretical Computer Science*, 35, 2000.

## Committee Service

- Co-organizer of a meeting at the prestigious the Leibniz Centre for Computer Science "Schloss Dagstuhl" on *Duality in Computer Science II*, 2015.
- Originator and Co-organizer of a meeting at the prestigious the Leibniz Centre for Computer Science "Schloss Dagstuhl" on *Duality in Computer Science*, 2013.
- Co-organizer of a meeting at the Leibniz Centre for Computer Science "Schloss Dagstuhl" on *Computing with Infinite Data: Topological and Logical Foundations*, 2011.
- Co-organizer, Special Session on *Computability in Analysis, Algebra, and Geometry* at the International Conference CiE 2011: Models of Computation in Context, Sofia, 2011.

- Program Committee Member, 7th International Conference on Computability and Constructivity in Analysis, Zhenjiang, 2010.
- Organizing Committee Member, Special Session on *Topology in Computer Science* at the Summer Topology Conference, Kielce, Poland, 2010.
- Program Committee Member, 5th International Symposium on Domain Theory, Shanghai, 2009.
- Co-organizer (chair), Workshop *Continuity, Computability, Constructivity: From Logic to Algorithms*, Cologne, 2009.
- Program Committee Member, 6th International Conference on Computability and Constructivity in Analysis, Ljubljana, 2009.
- Organizing Committee Member, Special Session on *Applied Topology* at the Summer Topology Conference, Mexico City, 2008.
- Program Committee Member, International Conference on Foundations of Informatics, Computing, and Software, Shanghai, 2008.
- Program Committee Member, International Conference on Infinity in Logic and Computation, Cape Town, 2007.
- Program Committee Member, Joint Workshop Domains VIII and Computability and Constructivity over Continuous Data Types, Novosibirsk, 2007.
- Program Committee Member, 4th International Conference on Computability and Constructivity in Analysis, Siena, 2007.
- Program Committee Member, 10th Workshop on Logic, Language, Information and Computation(WoLLIC'2003), Ouro Preto, Brazil, 2003.
- Program Committee Member, 2nd Workshop on Formal Topology, Venice, 2002.
- Program Committee Member, Mathematical Foundations of Program Semantics (MFPS 97), Pittsburgh, 1997.
- Co-organizer, Special Session on *Doing without Turing Machines: Constructivism and Formal Topology* at the International Conference CiE 2007: Computation and Logic in the Real World, Siena 2007.
- Organizing Committee Member, Special Session on *Topology in Computer Science* at the Summer Topology Conference, Denison University, USA, 2005.
- Organizing Committee Member, International Conference on Applicable General Topology, Ankara, 2001.
- Originator and co-organizer of a series of meetings at the Leibniz Centre for Computer Science "Schloss Dagstuhl" on topology in computer science:
  - *Computational Structures for Modelling Space, Time and Causality*, 2006;
  - *Spatial Representation: Discrete vs. Continuous Models*, 2004;
  - *Mathematical Structures for Computable Topology and Geometry*, 2002;

  - *Topology in Computer Science: Constructivity; asymmetry and partiality; digitization*, 2000.

- Organizer, Workshop on Domains IV, Rolandseck, Germany, 1998.

## Service to the Mathematical Community

- Referee for science foundations in Germany, Italy, Norway and Sweden.
- Referee for leading conferences and journals in computer science and logic.
- External examiner for Ph.D. and habilitation theses in Denmark, France, Germany, Norway, Sweden and the UK.
- Reviewer for Mathematical Reviews and Zentralblatt für Mathematik.

## Service in Discipline

- Member of the faculty council, several search committees, the examination committee, and several committees for the development of curricula.
- Head of a search committee, the examination committee, and of a departmental office that supervises the work that students have to do in an industrial environment.
- Originator of a new curriculum *Computer Science and Media*.
- Vice dean for research.

## Teaching Experience

Courses taught at the German open university in Hagen as well as at the universities in Aachen, Dortmund, Siegen (Germany), Padua, Perugia, Salerno, Siena (Italy) and Cape Town (South Africa):

- Undergraduate courses: Calculus for Computer Scientists I, Introduction to Computer Science I, II.
- Advanced undergraduate courses: Algorithms and Data Structures, Basics of Theoretical Computer Science.
- Graduate courses: Complexity Theory, Computability Theory, Lattices and Orders, Logic, Formal Languages, Semantics of Programming Languages, Theory of Programming, Verification.

## Theses Supervisions

**MSc Theses (**Only those with mark *magna cum laude* or better.)

- C. Uhrhan, *Verification of the Virtual Exact Real Number Machine* `iRRAM`, Siegen, 2011
- C.K. Jaya, *Colimits in the Category of Frames, Continuity of the Spectrum Functor und Co-continuity of the Functor* $\Omega$, Siegen 1910.
- T. Grubba, *A Simple Procedure for Solving Recursive Domain Equations*, Siegen, 1999.
- U. Peters, *Computable Analysis—a Comparison of Two Approaches*, Siegen, 1999.
- M. Colina, *Classical Proofs as Programs in the* $\lambda\mu$*-Caclculus*, Siegen, 1997.
- H. Schulz, *Computability on the Reals—a Comparison*, Siegen, 1997.
- R. Greb, *The Category of Strongly Finite Sequence Structures*, Siegen, 1996.
- B. Lichtenthäler, *Degrees of Parallelism*, Siegen, 1995.
- H. Emde, *Some Lower Complexity Classes and Their Automata*, Siegen, 1994.
- A. Gruchalski, *Computability on dI-Domains*, Siegen, 1993. (The main results appeared in *Information and Computation*.)
- H. Stahl, *On Polynomial-Time Computability*, Aachen, 1985.
- R. Majewski, *On Reducibilities in the Theory of Polynomial-Time Random Computability*, Aachen, 1983.
- M. Möller, *On Reducibilities of Truth-table Type*, Aachen, 1983,
- W.H. Kersjes, *Recursion Theory on Subsets of* $P$, Aachen, 1982.
- U. Offermann, *Counting n-Dimensional Trees*, Aachen, 1982.
- A. Müller, *On Some Special Gödel Numberings of the Partial Recursive Functions*, Aachen, 1981.

## Doctoral Theses

- H. Schulz, *Recursion and Subrecursion over Finite and Infinite Words with Applications to Computable Real-Valued Functions*, Siegen, 2006.
- C. Dupré, *Domain Models of Typed Lambda Calculi*, Siegen, 1996.
- H. Nickau, *Heriditarily Sequential Functionals: a Game-theoretic Approach to Sequentiality*, Siegen, 1996. (The results presented in this thesis led to an invitation to work in at Oxford University.)
- A. Gruchalski, *Constructive Domain Models of Typed Lambda Calculi*, Siegen, 1995.
- H. Sprenger, *Subclasses of Primitive-Recursive Functions on Term Algebras*, Siegen, 1995.