

# SAEED SALEHI

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# Affiliation and Positions

- University of Tabriz, Tabriz, Iran (since 2007). Associate Professor (since 2013).
- (Volunteer) Member of the Scientific Committee of *Tabriz Math House*, Tabriz, Iran (since 2014).
- An Editor of the *Journal of the Iranian Mathematical Society* (2019–2025).
- (Elected) Member of the Board of Directors of the *Iranian Association for Logic* (2019–2022).
- Researcher (Grantee) at the *Institute for Research in Fundamental Sciences* (IPM), Tehran, Iran (2010–2020).

### **Education and Degrees**

# **Postgraduate Studies**

(2005) PhD in Theoretical Computer Science, from the University of Turku (UTU), Turku, Finland.

- Supervisor: M. Steinby. Awarded study funds by Turku Centre for Computer Science (TUCS).
- Dissertation: Varieties of Tree Languages.

(2002) PhD in Mathematical Logic, from the Polish Academy of Sciences (PAN), Warsaw, Poland.

- Supervisor: Z. Adamowicz. Awarded study funds by the Institute of Mathematics (IMPAN).
- Dissertation: Herbrand Consistency in Arithmetics with Bounded Induction.

# **Undergraduate Studies**

(1997) BSc in Pure Mathematics, from Sharif University of Technology, Tehran, Iran.

o Graduated with Distinction, and the First Rank in the National Mathematical Olympiad 1997.

#### Research Interests

**Mathematics**: *Mathematical Logic* (Completeness, Decidability, and Axiomatizability).

Computer Science: Computability and Complexity Theory (and relations with Logic).

**Philosophy**: *Philosophy of Mathematics* (Constructivity, Intuitionism, and Incompleteness).

### **Publications**

# **Journal Papers and Book Chapters**

- (2025) On Gödel's 'much weaker' assumption, *History and Philosophy of Logic* (forthcoming).
- (2025) Proving concurrency by loci, International J. Math. Education in Science & Technology 56(4):800–808.
- (2024) A reunion of Gödel, Tarski, Carnap, and Rosser, Journal of Logic and Computation 34(6):1172–1178.
- (2022) Axiomatic (and non-axiomatic) mathematics, Rocky Mountain Journal of Mathematics 52(4):1157–76.
- (2022) [with Z. Assadi]; Gödelian sentences, Rosserian sentences and truth, J. Logic & Comput. 32(4):729–40.
- (2022) Tarski's undefinability theorem and the diagonal lemma, *Logic Journal of the IGPL* 30(3):489–98.
- (2022) 'Sometime a paradox', now proof: Yablo is not first order, Logic Journal of the IGPL 30(1):71–7.
- (2021) [with K. Lajevardi]; There may be many arithmetical Gödel sentences, *Philosophia Math.* 29(2):278–87.
- (2021) From intuitionism to many-valued logics through Kripke models, in: M. Mojtahedi, et al. (eds.), *Mathematics, Logic, and their Philosophies: Essays in Honour of Mohammad Ardeshir*, Springer, pp. 339–48.
- (2020) Gödel's second incompleteness theorem: how it is derived and what it delivers, *The Bulletin of Symbolic Logic* 26(3-4):241–56.
- (2020) On the diagonal lemma of Gödel and Carnap, The Bulletin of Symbolic Logic 26(1):80–8.

- (2020) On rudimentarity, primitive recursivity and representability, Reports on Mathematical Logic 55:73–85.
- (2020) [with M. Zarza]; First-order continuous induction, and a logical study of real closed fields, *Bulletin of the Iranian Mathematical Society* 46(1):225–43.
- (2019) [with K. Lajevardi]; On the arithmetical truth of self-referential sentences, *Theoria* 85(1):8–17.
- (2019) [w. Z. Assadī]; On decidability and axiomatizability of some ordered structures, *Soft Comp.* 23(11):3615–26.
- (2018) [with P. Seran]; On constructivity and the Rosser property: a closer look at some Gödelean proofs, *Annals of Pure and Applied Logic* 169(10):971–80.
- (2018) On axiomatizability of the multiplicative theory of numbers, Fundamenta Informaticae 159(3):279–96.
- (2018) [with P. SAFARI]; Kripke semantics for fuzzy logics, Soft Computing 22(3):839–44.
- (2017) [with P. Seraji]; Gödel-Rosser's incompleteness theorem: generalized and optimized for definable theories, *Journal of Logic and Computation* 27(5):1391–7.
- (2017) [with A. Karimi]; Diagonal arguments and fixed points, Bulletin Iranian Math. Soc. 43(5):1073–88.
- (2014) Gödel's incompleteness phenomenon—computationally, *Philosophia Scientiae* 18(3):23–37.
- (2013) Herbrand consistency of some finite fragments of bounded arithmetical theories, *Archive for Mathematical Logic* 52(3-4):317–33.
- (2012) Herbrand consistency of some arithmetical theories, *The Journal of Symbolic Logic* 22(3):807–27.
- (2012) Separating bounded arithmetical theories by Herbrand consistency, J. Logic & Comp. 77(3):545–60.
- (2007) [with M. Steinby]; Varieties of many-sorted recognizable sets, *Pure Math. & Applications* 18(3-4):319–43.
- (2007) [with M. Steinby]; Tree algebras and varieties of tree languages, *Theoretical Computer Sci.* 377(1-3):1–24.
- (2005) [with T. Petković]; Positive varieties of tree languages, *Theoretical Computer Science* 347(1):1–35.
- (2005) Varieties of tree languages definable by syntactic monoids, *Acta Cybernetica* 17(1):21–41.
- (2005) Congruence preserving functions of Wilke's tree algebras, Algebra Universalis 53(4):451–70.
- (2005) Polynomially bounded recursive realizability, *Notre Dame Journal of Formal Logic* 46(4):407–17.
- (2003) Provably total functions of Basic Arithmetic, Mathematical Logic Quarterly 49(3):316-22.
- (2003) [with M. Ardeshir & W. Ruttenburg]; Intuitionistic axiomatizations for bounded extension Kripke models, *Annals of Pure and Applied Logic* 124(1-3):267–85.
- (2002) Decidable formulas of intuitionistic primitive recursive arithmetic, Reports on Math. Logic 36:55–61.

### **Conference Papers**

- (2012) Axiomatizing mathematical theories: multiplication, in: A. Kamali-Nejad (ed.), *Proceedings of Frontiers in Mathematical Sciences*, Fundamental Education Publications (Iran), pp. 165–76.
- (2012) Computation in logic and logic in computation, in: B. Sadeghi-Bigham (ed.), *Proceedings of the* 3<sup>rd</sup> *Contemporary Issues in Computer and Information Sciences* (CICIS'12), Brown Walker Press (USA), pp. 580–3.
- (2003) A completeness property of Wilke's tree algebras, in: B. Rovan & P. Vojtáš (eds.), *Proceedings of the Mathematical Foundations of Computer Science* (MFCS'03), LNCS 2747, Springer, pp. 662–70.
- (2001) Unprovability of Herbrand consistency in weak arithmetics, in: K. Striegnitz (ed.), *Proceedings of European Summer School in Logic, Language and Information* (ESSLLI'01), *Student Session*, pp. 265–74.

### **Publications in Persian**

- (2019) [with P. Safari]; Truth values and connectives in some non-classical logics, *Journal of New Researches in Mathematics* 5(19):31–6.
- (2010) Logical number theory, Newsletter of the Iranian Mathematical Society 32(3-4):16.

### **Manuscripts**

- (2023) [with M. Jalilvand & B. Nikzad]; How (not) to compute the halting probability, SSRN: 4602807.
- (2023) On Chaitin's heuristic principle and halting probability, arXiv: 2310.14807.
- (2023) [with K. Lajevardi]; Soundness does not come for free (if at all), arXiv: 2310.13422.

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- (2023) [with K. Lajevardi]; On a fallacy concerning I-am-unprovable sentences, arXiv: 2311.06568.
- (2015) Theorems of Tarski's undefinability & Gödel's 2<sup>nd</sup> incompleteness-computationally, arXiv: 1509.00164.
- (2014) [with A. Karımı]; Theoremizing Yablo's paradox, arXiv: 1406.0134.

#### **Editorial Services**

### **Reviewer for**

- o Zentralblatt MATH (zbMATH) of the European Mathematical Society (EMS). Distinguished Reviewer 2014.
- o Mathematical Reviews (MR) of the American Mathematical Society (AMS).

#### Referee for

- The Journal of Symbolic Logic (JSL of the Association for Symbolic Logic).
- The Bulletin of Symbolic Logic (BSL of the Association for Symbolic Logic).
- o The Review of Symbolic Logic (RSL of the Association for Symbolic Logic).
- *Annals of Pure and Applied Logic* (APAL of Elsevier).
- Theoretical Computer Science (TCS of Elsevier).
- o Journal of Logic and Computation (JLC of the Oxford University Press).
- Logic Journal of the Interest Group in Pure and Applied Logics (IGPL of the Oxford University Press).
- o Philosophia Mathematica (PhilMath of the Oxford University Press).
- ACM Transactions on Computational Logic (TOCL of the Association for Computing Machinery).
- International Journal of Foundations of Computer Science (IJFCS of the World Scientific).
- Bulletin of the Iranian Mathematical Society (BIMS of Springer).
- o Journal of Logic, Language and Information (JLLI of Springer).
- o Discussiones Mathematicae—General Algebra and Applications (DMGAA of the University of Zielona Góra).
- o Notre Dame Journal of Formal Logic (NDJFL of the University of Notre Dame).
- o (Proceedings of the) Conferences: (i) WoLLIC 2017, (ii) AFL 2011, (iii) ICALP 2004.
- Iran National Science Foundation (INSF).
- Iranian Journal of Mathematical Sciences and Informatics (IJMSI of Tarbiat Modares University).
- o Mathematical Culture and Thought (MCT of the Iranian Mathematical Society, in Persian).

# Conferences and Visits

# **Organization** (a selection)

- (2023) A Member of the Scientific Committee of the 10<sup>th</sup> Annual Conference of the Iranian Association for Logic (IAL'23), Amirkabir University of Technology, Tehran, Iran, 22–23 February 2023.
- (2019) A Member of the Scientific Committee of the 6<sup>th</sup> Annual Conference of the Iranian Association for Logic (IAL'19), Shahid Beheshti University, Tehran, Iran, 21–22 January 2019.
- (2017) A Member of the Scientific Committee of the 5<sup>th</sup> Annual Conference of the Iranian Association for Logic (IAL'17), Amirkabir University of Technology, Tehran, Iran, 22–25 November 2017.
- (2010) Chair of Tabriz Seminar on Mathematical Logic, University of Tabriz, Iran, 27–28 October 2010.
- (2007) A member of the Scientific Committee of the 38<sup>th</sup> Annual Iranian Mathematics Conference (AIMC'38), Zanjan University, Zanjan, Iran, 3–6 September 2007.

#### **Invited Talks** (a selection)

- (2021) International Workshop on Gödel's Incompleteness Theorems [online] (Wuhan'21), Wuhan University, Wuhan, China, 16–20 August 2021. Title: Some Fairies in the Incompleteness Wonderland.
- (2021) Celebrating 90 Years of Gödel's Incompleteness Theorems [online and on-site] (Tübingen'21), Carl Friedrich von Weizsäcker Center, Nürtingen, Germany, 5–9 July 2021.
  - Title: The Diagonalization Lemma Demystified Hopefully.

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- (2017) Workshop on Proof Theory, Modal Logic and Reflection Principles (Wormshop'17), Steklov Mathematical Institute, Moscow, Russia, 17–20 October 2017. Title: *Diagonal-Free Proofs of the Diagonal Lemma*.
- (2016) Meta-arithmetical Results and their Philosophical Meaning (Swamplandia'16), Faculty of Arts and Philosophy, Ghent University, Ghent, Belgium, 30 May-1 June 2016.
  - Title (Tutorial): Gödel's Incompleteness Theorem: Constructivity of its Various Proofs.
  - Title (Talk): Theoremizing Paradoxes: Turning Puzzles into Proofs.
- (2015) The 3rd Annual Conference of the Iranian Association for Logic (IAL'15), Tarbiat Modares University, Tehran, Iran, 22–23 December 2015.
  - Title: Logic and Computation: A Constructive Look at Proofs of Gödel's Incompleteness Theorem.
- (2014) The 10<sup>th</sup> International Tbilisi Summer School in Logic and Language (Tbilisi'14), Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia, 22–27 September 2014.
  - Title (Tutorial): Axiomatic Mathematics: Issues of Decidability in Logic.
- (2012) The 3<sup>rd</sup> International Conference on Contemporary Issues in Computer and Information Sciences (CICIS'12), the Institute for Advanced Studies in Basic Sciences, Zanjan, Iran, 29–31 May 2012.
  - Title: Computation in Logic and Logic in Computation.
- (2008) Foundations and Trends in Computer Science (FTCS'08), Winter School by IPM School of Computer Science and United Nations University, IPM, Tehran, Iran, 31 January–10 February 2008.
  - Title (Tutorial): Logics in Computer Science.
- (2007) IPM Logic Conference (IPM-LC'07), IPM, Tehran, Iran, 10–15 June 2007.
  - Title: Modal Logic of Herbrand Consistency in Weak Arithmetics.
- (2006) Algebraic Theory of Automata and Logic (ATAL'06), a satellite event of the conference Computer Science Logic (CSL'06), Szeged, Hungary, 30 September–1 October 2006.
  - Title: Characterizing Families of Tree Languages by Syntactic Monoids.

# **Contributed Talks** (a selection)

- (2015) The 5<sup>th</sup> World Congress on Universal Logic (UniLog'15), University of Istanbul, Turkey, 20–30 June 2015.

  Title: *Theorems of Tarski and Gödel's Second Incompleteness—Computationally*.
- (2013) Frontiers in Mathematical Sciences—The Second Conference (Front'13), Sharif University of Technology, Tehran, Iran, 25–27 December 2013. Title: *Diagonalizing Out by Fixed-Points and Self-Reference*.
- (2012) Frontiers in Mathematical Sciences—A Conference in Honor of Siavash Shahshahani (Front'12), Sharif University of Technology, Tehran, Iran, 25–27 December 2012.
  - Title: Axiomatizing Mathematical Theories: Multiplication.
- (2011) The 14<sup>th</sup> Congress of Logic, Methodology and Philosophy of Science (CLMPS'2011), Nancy, France, 19–26 July 2011. Title: *Gödel's Incompleteness Phenomenon from Computational Viewpoint*.
- (2011) The ASL European Summer Meeting, Logic Colloquium (LC'11), Barcelona, Spain, 11–16 July 2011.

  Title: On Herbrand Consistency of Bounded Arithmetics.
- (2010) The International Workshop on Logical Approaches to Barriers in Computing and Complexity (LABCC'10), Alfried Krupp Wissenschaftskolleg, Greifswald, Germany, 17–20 February 2010.
   Title: *Herbrand Consistency of* IΔ<sub>0</sub> and IΔ<sub>0</sub> + Ω<sub>1</sub>. [On a travel grant].
- (2004) The Fourth European Congress of Mathematics (4ECM), Stockholm, Sweden, 27 June–2 July 2004.

  Title: *A Model-Theoretic Proof of an Incompleteness Theorem* (poster). [On a travel grant].
- (2003) The 28<sup>th</sup> International Symposium on Mathematical Foundations of Computer Science (MFCS'03), Bratislava, Slovakia, 25–29 August 2003. Title: *A Completeness Property of Wilke's Tree Algebras*.
- (2002) The 10<sup>th</sup> International Conference on Automata and Formal Languages (AFL'02), Debrecen, Hungary, 13–18 August 2002. Title: *Tree Algebras*.
- (2001) The (6<sup>th</sup>) Student Session of the (13<sup>th</sup>) European Summer School in Logic, Language and Information (ESSLLI'01), Helsinki, Finland, 13–24 August 2001.
  - Title: Unprovability of Herbrand Consistency in Weak Arithmetics. [On a Travel Grant].

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- (2001) The ASL European Summer Meeting, Logic Colloquium (LC'01), Vienna, Austria, 6–11 August 2001.
  - Title: Unprovability of Herbrand Consistency in Weak Arithmetics. [On an ASL Student Travel Grant].
- (2000) The ASL European Summer Meeting, Logic Colloquium (LC'00), Paris, France, 23-31 July 2000.
  - Title: A Generalized Realizability for Constructive Arithmetics. [On an ASL Student Travel Grant].
- (1999) The ASL European Summer Meeting, Logic Colloquium (LC'99), Utrecht, The Netherlands, 1–6 August 1999. Title: *Intuitionistic Axiomatization of End-Extension Kripke Models*. [On an ASL Travel Grant].

### Other Visits (a selection)

- (2007) Post-doctoral (funded) visit to Department of Mathematics, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran, October 2006–September 2007.
- (2006) Post-doctoral (funded) visit to Research Group for Theoretical Computer Science and Logic, Institute of Computer Science and Applied Mathematics, Universität Bern, Bern, Switzerland, September 2006.
- (2006) Post-doctoral (funded) visit to Department of Philosophy, Universiteit Utrecht, Utrecht, The Netherlands, April 2006.
- (2003) Participation (on a grant) at Summer School on Structural Theory of Automata, Semigroups and Universal Algebra, NATO Advanced Study Institute and Université de Montréal, Montreal, Canada, 7–18 July 2003.
- (2003) Participation (on a grant) at Summer School and Workshop on Proof Theory, Computation and Complexity, Technische Universität Dresden, Dresden, Germany, 23 June–4 July 2003.

# Teaching and Supervising

### **Taught Courses** (a selection)

Postgraduate Courses

Advanced Computability Theory • Complexity Theory • Logical Number Theory • Logic and Computation • Recursion Theory • Proof Theory • Modal Logic • Advanced Mathematical Logic • Universal Algebra

• Undergraduate Courses

Foundations of Mathematics • Mathematical Logic • Set Theory • Discrete Mathematics • Number Theory • Theory of Automata and Formal Languages • English as Lingua Franca for Mathematics • Calculus

# **Supervised PhD Theses**

- Department of Mathematics, University of Tabriz, Tabriz, Iran (in Persian):
- (2019) M. Zarza, Axiomatizations of Subfields of the Real Numbers.
- (2019) Z. Assadi, Decidability of the Multiplicative and Order Theory of Numbers.
- (2017) P. Safari, Investigating Kripke Semantics for Fuzzy Logics.
- (2016) P. Seraji, Rosserizing and Effectivizing Some Proofs of the First Incompleteness Theorem.
  - Department of Mathematics, Tarbiat Modares University, Tehran, Iran (in Persian):
- (2014) A. Karimi, Innovative Types in Unified Diagonal Argument.

# **Supervised MSc Theses**

- Department of Mathematics, University of Tabriz, Tabriz, Iran (in Persian):
- (2018) E. Rokni, Bounded Relations and their Relation to Primitive Recursive Relations.
- (2017) Y. Nobakht, Necessary and Sufficient Conditions for Undecidability of the Gödel Sentence and its Truth.
- (2017) Sh. Khaleghi, Standard Proofs for Gödel's Second Incompleteness Theorem.
- (2016) M. A. Tareeghee, Yablo's Paradox in Second-Order Logic.
- (2015) V. Delara Moghanloo, Yablo's Paradox and Gödel's Incompleteness Theorems.
- (2015) S. GhaniZadeh, Kolmogorov Complexity and Characteristic Constants of Formal Theories of Arithmetic.
- (2015) S. Sarvari Mehrabad, On Proofs of the Incompleteness Theorems Based on Berry's Paradox.
- (2015) M. Sahahi, The Incompleteness Theorems of Gödel and Rosser.
- (2014) Н. Shirzadeh, The Shortest Definition of a Number in Peano Arithmetic.

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- (2014) P. Ghaemi, The Surprise Examination Paradox and the Second Incompleteness Theorem.
- (2014) Sh. SadeghiBigham, Undecidability of First-Order Logic.
- (2013) M. Mohammadian, Incompleteness in a General Setting.
- (2012) S. Esmati, Nonstandard Models that are Definable in Peano Arithmetic.
- (2012) F. AzarPeyvand, Heterologicality and Incompleteness.
- (2012) N. JangiBahador, An Interpolation Theorem in First-Order Logic.
- (2010) M. Abedini, A Universal Approach to Self-Referential Paradoxes, Incompleteness and Fixed Points.
  - o Department of Mathematics, Institute for Advanced Studies in Basic Sciences, Zanjan, Iran (in Persian):
- (2010) F. Elmi, A Study of Algebraic Structures By Logical Tools.

# **Supervised BSc Theses**

- Department of Mathematics, University of Tabriz, Tabriz, Iran (in Persian):
- (2014) S. Hosseinkhani, A Mathematical Introduction to Logic.
- (2013) A. Esmailzadeh, The Philosophy and Logic of Mathematics.
- (2012) M. Jafari, The Foundations of Mathematical Sciences and Set Theory.
- (2011) M. Rezayati, Mathematical Logic and Set Theory.
- (2010) F. Karimi, The Foundations of Mathematics and Its Problems.

### Honors and Awards

# Grant Acquisition as PI (a selection)

- National Elites Foundation (BMN), Tehran, Iran (2008–2009).
- Iran National Science Foundation (INSF), Tehran, Iran (2018).
- Institute for Research in Fundamental Sciences (IPM), Tehran, Iran (2007, 2010–2017, 2019).
- University of Tabriz, Tabriz, Iran (2017–2020).

### **Honors** (a selection)

- (2014) Distinguished Reviewer of Zentralblatt MATH.
- (1997) The first rank in the national Mathematical Olympiad of University Students (in both of the 1<sup>st</sup> and the 2<sup>nd</sup>/final rounds), Iran.
- (1997) The first ranked graduate of Mathematics from Sharif University of Technology, Tehran, Iran.

#### Awards (a selection)

- Grant for participating at
  - \* LABCC'10, Greifswald, Germany, 17–20 February 2010 (with delivering a talk).
  - \* 4ECM, Stockholm, Sweden, 27 June–2 July 2004 (with presenting a poster).
  - \* SMS-NATO ASI 2003, Université de Montréal, Montreal, Canada, 7–18 July 2003.
  - \* PT-Event, Technische Universität Dresden, Dresden, Germany, 23 June–4 July 2003.
  - \* ESSLLI'01, Helsinki, Finland, 13–24 August 2001 (with delivering a talk).
- ASL Student Travel Grants for participating and *delivering talks* at Logic Colloquiums in 1999 (Utrecht, The Netherlands), 2000 (Paris, France), and 2001 (Vienna, Austria).
- Grants for PhD Studentship from IMPAN (Poland, 1999–2000) and TUCS (Finland, 2000–2005).

#### Miscellanea

#### **Some Internet Links**

GoogleScholar: xI4on2oAAAAJ PhilPapers: Saeed Salehi arXiv: salehi\_s\_1 DBLP: pid/95/520 ResearchGate: Saeed-Salehi-2 Math.Genealogy: 93048 MathSciNet: 714784 zbMATH: 10864

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SemanticScholar: 1468709567 Web of Science: Y-3287-2019

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