Curriculum vitae

Fernando Jorge Inocêncio Ferreira

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Departamento de Matemática, Universidade de Lisboa
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Personal

Born November 14, 1958 in Lisbon, Portugal. Portuguese citizen.

Academic interests

Mathematical Logic. Foundations of Mathematics.

Degrees

- 2005: *Agregação* in Mathematics, University of Lisbon. Title of the lesson: "Novas interpretações em teoria da demonstração."

- 1988: Ph.D. in Mathematics, Pennsylvania State University, USA. Dissertation: *Polynomial Time Computable Arithmetic and Conservative Extensions.* Advisor: Stephen G. Simpson.

- 1981: Undergraduate degree in Mathematics (five year degree), Universidade de Lisboa.

Academic position

Full Professor of Mathematics at Universidade de Lisboa.

Visits

- SNSF visitor to the University of Bern (Switzerland), Fall 2012.

- Tinker Visiting Professor, Stanford University (USA), Fall 2009.

- Fulbright Scholar, Harvard University (USA), Winter and Spring 2004.

- Visiting Scholar, University of Aarhus (Denmark), Fall 2003.

Distinctions

- Corresponding member of Academia das Ciências de Lisboa.

- Silver Medal of the Kurt Gödel Centenary Research Prize Fellowship (senior category). Templeton Foundation, 2008.

Books

- *Matemática Finita* (with Carlos André). Edited by Universidade Aberta. Lisboa, 309 pages (2000).

Articles

- "On the removal of weak compactness arguments in proof mining" (with Laurenţiu Leuştean and Pedro Pinto). **Advances in Mathematics** 354 (2019).

- "Zigzag and Fregean arithmetic." In: The Philosophers and Mathematics (H. Tahiri, ed.). Logic, Epistemology, and the Unity of Science 43, Springer International, 2018, pp. 81-100.

- "On some semi-constructive theories related with Kripke-Platek set theory." In: Feferman on Foundations. Logic, Mathematics, Philosophy (G. Jäger, W. Sieg, eds.). Outstanding Contributions to Logic, Springer International, 2017, pp. 347-384.

- "Categoricity and mathematical knowledge." **Revista Portuguesa de Filosofia** 73(3-4), pp. 1423-436 (2017).

- "A herbrandized functional interpretation of classical first-order logic" (with Gilda Ferreira), **Archive for Mathematical Logic** 56(5-6), pp. 523-539 (2017).

- "Analysis in weak systems" (with António Fernandes and Gilda Ferreira). In: Logic and Computation. Essays in Honour of Amílcar Sernadas (C. Caleiro, F. Dionísio, P. Gouveia, P. Mateus, J. Rasga, eds.). College Publications, 2017, pp. 231-261.

- "Interpreting weak Kőnig's lemma in theories of nonstandard arithmetic" (with Bruno Dinis), **Mathematical Logic Quarterly** 63, pp. 114-123 (2017).

- "An elementary proof of strong normalization for atomic F" (with Gilda Ferreira), **Bulletin of the Section of Logic** 45(1), pp. 1-15 (2016).

- "Spector's proof of the consistency of analysis." In: Gentzen's Centenary – the quest for consistency (R. Kahle, M. Rathjen, eds.). Springer, 2015, pp. 278-300.

- "The faithfulness of F_{at}: a proof-theoretic proof" (with Gilda Ferreira), **Studia Logica** 103, pp. 1303-1311 (2015).

- "Nonstandardness and the bounded functional interpretation" (with Jaime Gaspar). **Annals of Pure and Applied Logic** 166, pp. 665-740 (2015).

- "The finitistic consistency of Heck's predicative Fregean system" (with Luís Cruz-Filipe). **Notre Dame Journal of Formal Logic** 56, pp. 61-79 (2015).

- "A new computation of the Σ-ordinal of $\mathsf{KP}\omega$," **The Journal of Symbolic Logic** 79, pp. 306-324 (2014).

- "The faithfulness of atomic polymorphism" (with Gilda Ferreira). In: Trends in Logic XIII (A. Indrzejczak, J. Kaczmarek and Z. Zawidzki, eds.). Wydawnictwo Uniwersytetu Lodzkiego, Lodz 2014, pp. 55-65.

- "Interpretability in Robinson's Q" (with Gilda Ferreira), **The Bulletin of Symbolic Logic** 19, pp. 289-317 (2013).

- "Techniques in weak analysis for conservation results" (with António Fernandes and Gilda Ferreira). In: *New Studies in Weak Arithmetics*, P. Cégielski, Ch. Cornaros and C. Dimitracopoulos (eds.), CSLI Publications (Stanford) and Presses Universitaires (Paris 12) 2013, pp. 115-147.

- "Atomic polymorphism" (with Gilda Ferreira), **The Journal of Symbolic Logic** 78, pp. 260-274 (2013).

- "On the notion of object. A logical genealogy," **Disputatio** 24, pp. 609-624 (2012).

- "A short note on Spector's proof of consistency on analysis." In: *How the World Computes* (B. Cooper, A. Dawar & B. Löwe, eds.), proceeedings of the Turing Centenary Conference and of CiE 2012. Lecture Notes in Computer Science, vol. 7318, Springer 2012, pp. 222-227.

- "The bounded functional interpretation of the double negation shift" (with Patrícia Engrácia), **The Journal of Symbolic Logic** 75, pp. 759-773 (2010).

- "Proof interpretations and majorizability." In: *Logic Colloquium'07* (organizado por Françoise Delon *et al.*), *Lecture Notes on Logic* 35, pp. 32-81. Cambridge University Press (2010).

- "Commuting conversions vs. the standard conversions of the 'good' connectives" (with Gilda Ferreira), **Studia Logica** 92, pp. 63-84 (2009).

- "Injecting uniformities into Peano arithmetic," **Annals of Pure and Applied Logic** 157, pp. 122-129 (2009). Número especial: *Kurt Gödel Centenary Research Prize Fellowships*, edited by S. Artemov, M. Baaz and H. Friedman.

- "The co-ordination principles: a problem for bilateralism," **Mind** 117, pp. 1051-1057 (2008).

- "Harrington's conservation result redone," (with Gilda Ferreira). **Archive for Mathematical Logic** 47, pp. 91-100 (2008).

- "A most artistic package of a jumble of ideas," invited article in commemoration of the 50th anniversary of Gödel's *dialectica* paper (T. Strahm, guest editor). **dialectica** 62, 205-222 (2008) .

- "The Riemann integral in weak systems of arithmetic" (with Gilda Ferreira). **Journal of Universal Computer Science** 14, pp. 908-937 (2008).

- "Bounded functional interpretation and feasible analysis" (with Paulo Oliva). **Annals of Pure and Applied Logic** 145, pp. 115-129 (2007).

- "Counting as integration in feasible analysis" (with Gilda Ferreira). **Mathematical Logic Quarterly** 52, pp. 315-320 (2006).

- "Comments on predicative logic," **Journal of Philosophical Logic** 35, pp. 1-8 (2006).

- "Bounded modified realizability" (with Ana Nunes). **The Journal of Symbolic Logic** 71, pp. 329-346 (2006).

- "To catch one's own shadow," invited article. In *Actas do Segundo Encontro Nacional de Filosofia Analítica* (ed. Sofia Miguens, João Alberto Pinto and Carlos Mauro), Faculdade de Letras da Universidade do Porto, Porto 2006, pp. 14-16.

- "Bounded functional interpretation" (with Paulo Oliva), **Annals of Pure and Applied Logic** 135, pp. 73-112 (2005).

- "A simple proof of Parsons' theorem," **Notre Dame Journal of Formal Logic** 46, pp. 83-91 (2005).

- "Basic applications of weak König's lemma in feasible analysis" (with António Fernandes). In: *Reverse Mathematics 2001* (S. Simpson, ed.), Lecture Notes in Logic (Association for Symbolic Logic), vol. 21, A K Peters 2005, pp. 175-188.

- "Amending Frege's *Grundgesetze der Arithmetik*," **Synthese** 147, pp. 3-19 (2005). An extended abstract of this paper is published in portuguese under the title "Emendando o *Grundgesetze der Arithmetik* de Frege" in *Encontro Nacional de Filosofia Analítica*, organized by Henrique Jales Ribeiro, Universidade de Coimbra, Coimbra 2003, pp. 137-142.

- "On the consistency of the Δ_1^1-CA fragment of Frege's *Grundgesetze*" (with Kai Wehmeier), **Journal of Philosophical Logic**, 31, pp. 301-311 (2002).

- "Groundwork for weak analysis" (with António Fernandes), **The Journal of Symbolic Logic**, 67, pp. 557-578 (2002).

- "A two-worlds, two-semantics, interpretation of Plato's *Sophist*." In: *Greek Philosophy and Epistemology*, volume II (ed. Constantine Boudouris), Ionia Publications 2001, Athens, pp. 61-68.

- "Two general results on intuitionistic bounded theories," **Mathematical Logic Quarterly** 45, pp. 399-407 (1999).

- "A note on finiteness in the predicative foundations of arithmetic," **Journal of Philosophical Logic** 28, pp. 165-174 (1999).

- "A substitutional framework for arithmetical validity," **Grazer Philosophische Studien** 56, pp. 91-107 (1999).

- "On the Parmenidean misconception," **Philosophiegeschichte und logische Analyse** 2, pp. 37-49 (1999). A first version of this paper appeared in Portuguese under the title "Exercícios eleáticos" in **Disputatio** 2, pp. 3-21 (1997).

- "Extracting algorithms from intuitionistic proofs" (with António Fernandes), **Mathematical Logic Quarterly** 44, pp. 143-160 (1998).

- "On end extensions of models of $\neg exp$," **Mathematical Logic Quarterly** 42, pp. 1-18 (1996).

- "Some notes on subword quantification and induction thereof." In : *Logic and Algebra* (A. Ursini & P. Aglianò, eds.), Lecture Notes in Pure and Applied Mathematics 180, Marcel Dekker 1996, pp. 477-489.

- "What are the $\forall \Sigma_1^b$-consequences of T_2^1 and T_2^2?" **Annals of Pure and Applied Logic** 75, pp. 79-88 (1995).

- "A note on a result of Buss concerning bounded theories and the collection scheme," **Portugaliae Mathematica** 52, pp. 331-336 (1995).

- "A feasible theory for analysis," **The Journal of Symbolic Logic** 59, pp. 1000-1011 (1994).

- "Binary models generated by their tally part," **Archive for Mathematical Logic** 33, pp. 283-289 (1994).

- "Stockmeyer induction." In: *Feasible Mathematics* (S. Buss and P. Scott, eds.), Progress in Computer Science and Applied Logic 9, Birkhäuser 1990, pp. 161-180.

- "Polynomial time computable arithmetic." In: *Logic and Computation* (W. Sieg, ed.), Contemporary Mathematics 106, American Mathematical Society 1990, pp. 137-156.

Essays and expository articles (in portuguese)

- "O problema da decisão e a máquina universal de Turing." To appear in a volume commemorating the centenary of Alan Turing (edited by José Carlos Espírito Santo).

- "A lógica matemática como empreendimento fundamentador." In: Memórias da Academia das Ciências de Lisboa, Classe de Ciências, tome XLV. ACL, 2018, pp. 7-20.

- "Logicismo." In: *Compêndio em Linha de Problemas de Filosofia Analítica* (2014). João Branquinho e Ricardo Santos (eds.). Lisboa: Centro de Filosofia da Universidade de Lisboa.

- "*Grundlagenstreit* e o intuicionismo Brouweriano." In: **Boletim da Sociedade Portuguesa de Matemática** 58, pp. 1-23 (2008).

- "A matemática de Kurt Gödel." In: **Boletim da Sociedade Portuguesa de Matemática** 55, pp. 39-62 (2006).

- "O problema P versus NP." In: *2000 Matemática $\sqrt{Radical}$* (Miguel Ramos and Jorge Nuno Silva, eds.), Textos de Matemática, Departamento de Matemática da Universidade de Lisboa, Lisboa 2002, pp. 1-15.

- "Teoria dos conjuntos: uma vista." In: **Boletim da Sociedade Portuguesa de Matemática** 38, pp. 29-47 (1998). This paper is an expansion of the entry "Teoria dos Conjuntos" in *Enciclopédia de Termos Lógico-Filosóficos*, organized by João Branquinho and Desidério Murcho (Colecção Filosofia Aberta, no. 11, Gradiva Publicações, Lisboa, 2001).

- "Lógica, filosofia e matemática." Essay followed by an interview in: *A Cultura da Subtileza (Aspectos da Filosofia Analítica)* (Manuel Lourenço, ed.), Colecção Trajectos Portugueses, Gradiva Publicações, Lisboa 1995, pp. 110-126.

- "No paraíso, sem convicção... (uma explicação do programa de Hilbert)." In: *Matemática e Cultura II* (Furtado Coelho, ed.), Centro Nacional de Cultura and SPB Editores, Lisbon 1995, pp. 87-121.

- "Análise, exequibilidade e lógica." In: *Actas do III Encontro dos Algebristas Portugueses* (Marques de Sá et al., eds.), Departament of Mathematics, University of Coimbra (1994), pp. 49-70.

- "Como ser sério com palavras cruzadas." In: *Matemática e Cultura I* (Furtado Coelho, ed.), Centro Nacional de Cultura and Edições Cosmos, Lisboa and Porto 1992, pp. 37-53.

Reviews

- Of *A Course in Mathematical Logic for Mathematicians* (2nd edition), Yuri Manin, Graduate Texts in Mathematics, Springer Verlag, 2009. **Newsletter of the European Mathematical Society** 78, pp. 61-63 (2010).

- Of *Gödel's theorem. An incomplete guide to its use and abuse*, Torkel Franzén, A K Peters, Wellesley, Massachusetts, 2005. **Boletim da Sociedade Portuguesa de Matemática** 55, pp. 39-62, 2006 (in portuguese).

- Of *Fixing Frege*, John Burgess, Princeton University Press, 2005. In **Australasian Journal of Philosophy**, vol. 84, no. 3, pp. 464-466 (2006).

- Of "Polynomial time operations in explicit mathematics," Thomas Strahm, The Journal of Symbolic Logic, vol. 62 (1997), pp. 575-594 and of "Feasible operations and applicative theories based on $\lambda\eta$," Andrea Cantini, Mathematical Logic Quarterly, vol. 46 (2000), pp. 291-312. In **The Bulletin of Symbolic Logic**, volume 8, pp. 534-535 (2002).

- Of "The function $\lfloor a/m \rfloor$ in sharply bounded arithmetic," Mitsuro Tada and Makoto Tatsuta, Archive for Mathematical Logic, vol. 37, pp.51-57 (1997). In **The Bulletin of Symbolic Logic**, volume 7, p. 391 (2001).

- Of *Arithmetic, Proof Theory and Computational Complexity* (P. Clote and J. Krajíček, eds.), Oxford Logic Guides 23, Oxford University Press, 1993. In **The Journal of Symbolic Logic** 60, pp. 1014-1017 (1995).

Editions

- Co-editor of **Journal of Logic and Computation**, 25, vol. 4, pp. 983-1140 (2015), a special number dedicated to CiE2010 (Computability in Europe 2010).

- Co-editor of **Theory of Computing Systems**, 51, vol. 3, pp. 267-400 (2012), a special number dedicated to CiE2010 (Computability in Europe 2010).

- Co-editor of **Annals of Pure and Applied Logic**, 163, vol. 6, pp. 621-742 (2012), a special number dedicated to CiE2010 (Computability in Europe 2010).

- *Programs, Proofs, Processes*, Proceedings of CiE2010 (Computability in Europe 2010). Eds. Fernando Ferreira *et al.* Lecture Notes in Computer Science 6158. Springer Verlag, 2010.

- Editor of a volume commemorating the centenary of Kurt Gödel: **Boletim da Sociedade Portuguesa de Matemática**, vol. 55 (2006).

Teaching experience

Topology (junior), Discrete Mathematics (sophomore), First-order Logic (freshmen), Introduction to Set Theory (junior), Introduction to Number Theory (junior), Philosophy of Mathematics (senior and graduate), Mathematical Logic (graduate), Proof Theory (graduate, in Lisbon and Stanford), Topics in Philosophical Logic (graduate), Set Theory (graduate), Model Theory (graduate), Topics in Mathematical Logic (graduate), Functional Interpretations (graduate, in Stanford), Computational Complexity (graduate). Also, classes in Algebra (sophomore), Linear Algebra (freshmen), Calculus I (freshmen), Calculus II (freshmen).

Doctoral students

- Patrícia da Conceição Engrácia. Dissertation title: "Proof-theoretical studies on the bounded functional interpretation." September 2009.

- Eduardo Jorge de Sousa Castro. Dissertation title: "A indispensabilidade da matemática na ciência natural." A thesis in Philosophy co-supervised with Professor João Branquinho. January 2008.

- Gilda Maria Saraiva Dias Ferreira. Dissertation title: "Sistemas de análise fraca para a integração." October 2006.

- António Marques Fernandes. Dissertation title: "Investigações em sistemas de análise exe–quível." July 2001.

- Isabel Maria Oitavem Fonseca da Rocha. Dissertation title: "Classes of computational complexity: implicit characterizations - a study in mathematical logic." July 2001.

Master students

- Ana de Almeida Gabriel Vieira Borges. Dissertation in Mathematics at Instituto Superior Técnico of Universidade de Lisboa (co-supervised with professors Carlos Caleiro and Ulrich Kohlenbach). Title: "On the herbrandised interpretation for nonstandard arithmetic." December 2016.

- Sílvia da Conceição Alexandre Reis. Dissertation in Mathematics (main supervision of Gilda Ferreira). Title: "Unificação das interpretações funcionais via lógica linear intuicionista." July 2014.

- João Filipe Pereira da Silva Enes. Dissertation in Mathematics. Title: "Um estudo sobre teorias de definições indutivas e admissibilidade." December 2013.

- Pedro Miguel dos Santos Pinto. Dissertation in Mathematics (co-supervised with Professor Pedro Miguel Duarte). Title: "Teorema da estrutura de Furstenberg: demonstração e redução ao nível ω^{ω^ω}." December 2013.

- Josiano Cláudio Oliveira Nereu. Dissertation in Philosophy (co-supervised by Professor Pedro Alves). Title: "Introducing choice sequences into mathematical ontology." April 2012.

- Renata Maria Machado Teixeira. Dissertation in Mathematics. Title: "Normalização de termos no cálculo dos combinadores." July 2008.

- Jaime da Gama Gaspar. Dissertation in Mathematics. Title: "Em torno das interpretações funcionais da aritmética." December 2007.

- Nuno Gonçalo Baptista dos Santos. Dissertation in Philosophy. Title: "O desafio filosófico da lógica intuicionista." September 2007.

- Luís Miguel da Silva Pereira. Dissertation in Mathematics. Title: "O problema dos cardinais singulares." September 2004.

- Sancho Telo Abreu Ataíde Neves da Silva. Dissertation in Philosophy. Title: "Em torno da filosofia da matemática de Frege." January 2002.

- Gilda Maria Saraiva Dias Ferreira. Dissertation in Mathematics. Title: "Aritmética computável em espaço polinomial." January 2002.

- Isabel Maria Oitavem Fonseca da Rocha. Dissertation in Mathematics. Title: "Três assuntos de lógica e complexidade." February 1995.

- António Marques Fernandes. Dissertation in Mathematics. Title: "O teorema de Morley no contexto da teoria da classificação." June 1993.

Other professional activities (selection)

- Member of the editorial board of *Review of Symbolic Logic*, Association for Symbolic Logic and Cambridge University Press. Member of the editorial board of *DISPUTATIO - Revista Internacional de Filosofia Analítica* (since its foundation in 1996). Member of the scientific committe of *Cadernos de Lógica e Computação*, College Publications, London. Former member of the editorial board of *Portugaliae Mathematica* (2013-2015). Former steering committee member of the series of conferences *Logic and Computational Complexity* (2003-2015).

- Member of *Centro de Matemática e Aplicações Fundamentais e Investigação Operacional*.

- Co-founder in 1989 of the *Seminário de Lógica Matemática* of the University of Lisbon.

- Programme Committee member of *Logic Colloquium'17* (Stockholm, 2017), *Classical Logic & Computation 2016* (Oporto, 2016), *Thirteenth International Conference on Computability and Complexity in Analysis* (Faro, Portugal, 2016), *Encontro Nacional de Filosofia Analítica* (Braga, Portugal, 2012), *Computability in Europe 2011* (Sofia, Bulgaria), *Encontro Nacional da Sociedade Portuguesa de Matemática* (Leiria, Portugal, 2010), *Logic Colloquium'09* (Sofia, Bulgaria, 2009), *Encontro Nacional de Filosofia Analítica* (Évora, Portugal, 2009), *Classical Logic & Computation* (Reykjavik, Iceland, 2008), *Computability in Europe 2007* (Siena, Italy), *Computability in Europe 2006* (Swansea, Wales, United Kingdom).

- Member of the *Sociedade Portuguesa de Matemática*, *Association for Symbolic Logic*, *American Mathematical Society* and *Sociedade Portuguesa de Filosofia*. Member and former president (2007 - 2012) of *Sociedade Portuguesa de Filosofia Analítica*.