

Curriculum Vitae of *VALENTINA HARIZANOV*  
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### ***Professional Experience***

**Professor of Mathematics**, George Washington University, 2003–present.  
**Eisenbud Professor**, Mathematical Sciences Research Institute, Berkeley, Fall 2020.  
**Visiting Professor**, Kurt Gödel Research Center, University of Vienna, Austria, 2014.  
**Co-director of the Center for Quantum Computing, Information, Logic and Topology**,  
George Washington University, 2011–18.  
**Associate Professor of Mathematics**, George Washington University, 1994–2002.  
**Visiting Associate Professor of Mathematics**, University of Maryland, College Park, 1994.  
**Assistant Professor of Mathematics**, George Washington University, 1987–93.

### ***Education***

**Doctor of Philosophy in Mathematics**, University of Wisconsin, Madison, 1987.  
Dissertation advisor: Terrence Millar.  
Dissertation: *Degree Spectrum of a Recursive Relation on a Recursive Structure*, 95 pp.  
**Master of Arts in Mathematics**, University of Wisconsin, Madison, 1984.  
**Master of Science in Mathematics**, University of Belgrade, Yugoslavia, 1981.  
Thesis: *Generalized Quantifiers*, 69 pp. (in Serbian).  
**Bachelor of Science in Mathematics**, University of Belgrade, Yugoslavia, 1978.  
Award: *Best Student in the College of Sciences* in the class of '78.

### ***Research Papers in Peer-Reviewed Journals and Volumes***

(The authors are listed **lexicographically**, as customary in mathematics.)

87. W. Calvert, D. Cenzer, D. Gonzalez, and **V. Harizanov**, “[Generically computable linear orderings](#),” submitted.
86. W. Calvert, **V. Harizanov**, and A. Shlapentokh, “[Computability in infinite Galois theory and algorithmically random algebraic fields](#),” submitted.
85. **V. Harizanov** and K. Srinivasan, “Cohesive powers of function structures,” submitted.
84. W. Calvert, D. Cenzer, and **V. Harizanov**, “Generically computable Abelian groups and isomorphisms,” submitted.
83. **V. Harizanov** and K. Srinivasan, “[Cohesive powers of structures](#),” to appear in *Archive for Mathematical Logic*.

82. W. Calvert, D. Cenzer, and **V. Harizanov**, “Generically computable Abelian groups,” in: *Unconventional Computation and Natural Computation*, Proceedings of the 20th International Conference UCNC 2023, Jacksonville, FL, USA, March 13–17, 2023, LNCS 14003, D. Genova and J. Kari, eds., Springer (2023), pp. 32–45.
81. **V. Harizanov** and K. Srinivasan, “Effective ultrapowers of graphs and other structures,” accepted for publication in the AMS *Contemporary Mathematics*.
80. J. Chubb, **V. Harizanov**, and D. Verta, “Complexity of properties of computable magmas,” accepted for publication in the AMS *Contemporary Mathematics*.
79. **V. Harizanov**, “Computable isomorphism problem,” in: *Scientific Legacy of Professor Zbigniew Oziewicz*, Selected Papers from the International Conference “Applied Category Theory Graph-Operad-Logic,” Series on Knots and Everything vol. 75, H. Garcia, J. Guzmán, L. Kauffman, and H. Makaruk, eds., World Scientific (2023), pp. 671–692.
78. R. Dimitrov, **V. Harizanov**, A. Morozov, P. Shafer, A. Soskova, and S. Vatev, “On cohesive powers of linear orders,” *Journal of Symbolic Logic* 88 (2023), pp. 947–1004.
77. R. Dimitrov and **V. Harizanov**, “Effective ultrapowers and applications,” in: *Aspects of Computation and Automata Theory with Applications*, N. Greenberg, S. Jain, K.M. Ng, S. Schewe, F. Stephan, G. Wu, Y. Yang, eds., IMS, National University of Singapore, LNS vol. 42, World Scientific (2023), pp. 201–221.
76. **V. Harizanov**, “[Logic in the history and philosophy of the mathematical practice](#),” in: *Handbook of the History and Philosophy of Mathematical Practice*, Bharath Sriraman, ed., Springer, in press.
75. **V. Harizanov**, K. Srinivasan and D. Verta, “[Computability theory](#),” in: *Handbook of the History and Philosophy of Mathematical Practice*, Bharath Sriraman, ed., Springer, in press.
74. R. Dimitrov and **V. Harizanov**, “[Countable nonstandard models: following Skolem’s approach](#),” accepted for publication in: *Handbook of the History and Philosophy of Mathematical Practice*, Springer, Bharath Sriraman, ed., published online 2022.
73. W. Calvert, D. Cenzer, and **V. Harizanov**, “Generically and coarsely computable isomorphisms,” *Computability* 11 (2022), pp. 223–239.
72. **V. Harizanov**, S. Lempp, C. McCoy, A. Morozov and R. Solomon, “On the isomorphism problem for some classes of computable algebraic structures,” *Archive for Mathematical Logic* 61 (2022), pp. 813–825.
71. R. Alvir, W. Calvert, G. Goodman, **V. Harizanov**, J. Knight. R. Miller, A. Morozov, A. Soskova, and R. Weisshaar, “Interpreting a field in its Heisenberg group,” *Journal of Symbolic Logic* 87 (2022), pp. 1215–1230.

70. W. Calvert, D. Cenzer, and **V. Harizanov**, “Densely computable structures,” *Journal of Logic and Computation* 32 (2022), pp. 581–607.
69. T. Ha, **V. Harizanov**, L. Marshall and H. Walker, “Computability and definability,” in: *Structure and Randomness in Computability and Set Theory*, D. Cenzer, C. Porter and J. Zapletal, editors, World Scientific, Singapore (2021), pp. 285–355.
68. S.S. Goncharov, **V. Harizanov**, and R. Miller, “On decidable categoricity and almost prime models,” *Siberian Advances in Mathematics* 30 (2020), pp. 200–212.
67. R. Dimitrov, **V. Harizanov**, and A. Morozov, “Turing degrees and automorphism groups of substructure lattices,” *Algebra and Logic* 59 (2020), pp. 27–47 (Russian); pp. 18–32 (English translation).
66. S.S. Goncharov, **V. Harizanov**, and R. Miller, “Turing degrees of complete formulas of almost prime models,” *Algebra and Logic* (communication) 58 (2019), pp. 417–425 (Russian); pp. 282–287 (English translation).
65. R. Dimitrov, **V. Harizanov**, A. Morozov, P. Shafer, A. Soskova, and S. Vatev, “Cohesive powers of linear orders,” in: *Computing with Foresight and Industry*, F. Manea, B. Martin, D. Paulusma and G. Primiero, editors, Computability in Europe, Durham, UK, Springer (2019), pp. 168–180.
64. E. Fokina, **V. Harizanov**, and D. Turetsky, “Computability-theoretic categoricity and Scott families,” *Annals of Pure and Applied Logic* 170 (2019), pp. 699–717.
63. W. Calvert, A. Frolov, **V. Harizanov**, J. Knight, C. McCoy, A. Soskova, and S. Vatev, “Strong jump inversion,” *Journal of Logic and Computation* 28 (2018), pp. 1499–1522.
62. T. Ha and **V. Harizanov**, “Orders on magmas and computability theory,” *Journal of Knot Theory and Ramifications* 27 (2018), pp. 184001 (1–13).
61. J. Chubb, M. Dabkowski, and **V. Harizanov**, “Groups with orderings of arbitrary algorithmic complexity,” in: *Sets and Computations* (IMS, National University of Singapore, Lecture Notes Series 33), R. Dilip, S.D. Friedman, and Y. Yang, editors, World Scientific (2017), pp. 221–251.
60. R. Dimitrov and **V. Harizanov**, “The lattice of computably enumerable vector spaces,” in: *Computability and Complexity*, A. Day, M. Fellows, N. Greenberg, B. Khossainov, A. Melnikov, and F. Rosamond, editors, Lecture Notes in Computer Science 10010, Springer (2017), pp. 366–393.
59. R. Dimitrov, **V. Harizanov**, and A. Morozov, “Automorphism groups of substructure lattices of vector spaces in computable algebra,” in: *Pursuit of the Universal*, 12th Conference on Computability in Europe, A. Beckmann, L. Bienvenu, and N. Jonoska, editors, Lecture Notes in Computer Science 9709, Springer (2016), pp. 251–260.

58. R. Dimitrov and **V. Harizanov**, “Orbits of maximal vector spaces,” *Algebra and Logic* 54 (2015), pp. 680–732 (Russian); (2016), pp. 440–477 (English translation).
57. J. Chubb and **V. Harizanov**, “A (very) brief tour of quantum mechanics, computation, and category theory,” in: *Logic and Algebraic Structures in Quantum Computing*, J. Chubb, A. Eskandarian, and V. Harizanov, editors, Cambridge University Press (2016), pp. 8–22.
56. E. Fokina, S. Goncharov, **V. Harizanov**, O. Kudinov, and D. Turetsky, “Index sets for  $n$ -decidable structures categorical relative to  $m$ -decidable presentations,” *Algebra and Logic* 54 (2015), pp. 520–528 (Russian); pp. 336–341 (English translation).
55. W. Calvert, **V. Harizanov**, and A. Shlapentokh, “Turing degrees of isomorphism types of geometric objects,” *Computability* 3 (2014), pp. 105–134.
54. E. Fokina, **V. Harizanov**, and A. Melnikov, “Computable model theory,” in: *Turing’s Legacy: Developments from Turing’s Ideas in Logic*, Turing’s birth centennial volume, R. Downey, editor, Cambridge University Press/ASL (2014) pp. 124–194.
53. R. Dimitrov, **V. Harizanov**, R. Miller, and K.J. Mourad, “Isomorphisms of non-standard fields and Ash’s conjecture,” in: *Language, Life, Limits*, 10th Conference on Computability in Europe, A. Beckmann, E. Csuhaj-Varjú, and K. Meer, editors, Lecture Notes in Computer Science 8493, Springer (2014), pp. 143–152.
52. D. Cenzer, **V. Harizanov**, and J. Remmel, “Computability-theoretic properties of injection structures,” *Algebra and Logic* 53 (2014), pp. 60–108 (Russian); pp. 39–69 (English translation).
51. D. Cenzer, **V. Harizanov**, and J. Remmel, “Two-to-one structures,” *Journal of Logic and Computation* 23 (2013), pp. 1195–1223.
50. J. Carson, **V. Harizanov**, J. Knight, K. Lange, C. McCoy, A. Morozov, S. Quinn, C. Safranski, and J. Wallbaum, “Describing free groups,” *Transactions of the American Mathematical Society* 364 (2012), pp. 5715–5728.
49. A. Frolov, **V. Harizanov**, I. Kalimullin, O. Kudinov, and R. Miller, “Spectra of  $\text{high}_n$  and  $\text{non-low}_n$  degrees,” *Journal of Logic and Computation* 22 (2012), pp. 755–777.
48. J. Carson, E. Fokina, **V. Harizanov**, J. Knight, S. Quinn, C. Safranski, and J. Wallbaum, “The computable embedding problem,” *Algebra and Logic* 50 (2012), pp. 478–493.
47. E. Fokina, Sy-D. Friedman, **V. Harizanov**, J. Knight, C. McCoy, and A. Montalbán, “Isomorphism relations on computable structures,” *Journal of Symbolic Logic* 77 (2012), pp. 122–131.
46. D. Cenzer, **V. Harizanov**, and J. Remmel, “Effective categoricity of injection structures,” in: *Models of Computation in Context*, Benedikt Löwe, Dag Normann, Ivan Soskov, editors, 10th Conference on Computability in Europe, Lecture Notes in Computer Science 6735, Springer (2011), pp. 51–60.

45. D. Cenzer, **V. Harizanov**, and J. Remmel, “ $\Sigma_1^0$  and  $\Pi_1^0$  equivalence structures,” *Annals of Pure and Applied Logic* 162 (2011), pp. 490–503, expanded version of paper 38.
44. B. Csima, **V. Harizanov**, R. Miller, and A. Montalbán, “Computability of Fraïssé limits,” *Journal of Symbolic Logic* 76 (2011), pp. 66–93.
43. M. Dabkowska, M. Dabkowski, **V. Harizanov**, and A. Togha, “Spaces of orders and their Turing degree spectra,” *Annals of Pure and Applied Logic* 161 (2010), pp. 1134–1143.
42. **V. Harizanov**, R. Miller and A. Morozov, “Simple structures with complex symmetry,” *Algebra and Logic* 49 (2010), pp. 98–134.
41. J. Chisholm, E. Fokina, S. Goncharov, **V. Harizanov**, J. Knight, and S. Quinn, “Intrinsic bounds on complexity and definability at limit levels,” *Journal of Symbolic Logic* 74 (2009), pp. 1047–1060.
40. W. Calvert, D. Cenzer, **V. Harizanov**, and A. Morozov, “Effective categoricity of Abelian  $p$ -groups,” *Annals of Pure and Applied Logic* 159 (2009), pp. 187–197.
39. J. Chubb, A. Frolov, and **V. Harizanov**, “Degree spectra of the successor relation on computable linear orderings,” *Archive for Mathematical Logic* 48 (2009), pp. 7–13.
38. D. Cenzer, **V. Harizanov**, and J. Remmel, “ $\Sigma_1^0$  and  $\Pi_1^0$  equivalence structures,” in: *Mathematical Theory and Computational Practice*, K. Ambos-Spies, B. Löwe, and W. Merkle, editors, 5th Conference on Computability in Europe, Lecture Notes in Computer Science 5635, Springer, Berlin (2009), pp. 99–108.
37. C. Jockusch, **V. Harizanov**, and J. Knight, “Chains and antichains in computable partial orderings,” *Archive for Mathematical Logic* 48 (2009), pp. 39–53.
36. J. Chubb, **V. Harizanov**, A. Morozov, S. Pingrey, and E. Ufferman, “Partial automorphism semigroups,” *Annals of Pure and Applied Logic* 156 (2008), pp. 245–258.
35. J. Chisholm, J. Chubb, **V. Harizanov**, D. Hirschfeldt, C. Jockusch, T. McNicholl, and S. Pingrey, “ $\Pi_1^0$  classes and strong degree spectra of relations,” *Journal of Symbolic Logic* 72 (2007), pp. 1003–1018.
34. M. Friend, N. Goethe, and **V. Harizanov**, “Introduction to the philosophy and mathematics of inductive inference,” in: *Induction, Algorithmic Learning Theory, and Philosophy*, M. Friend, N.B. Goethe, and V.S. Harizanov, editors, Springer, Dordrecht (2007), pp. 1–24.
33. **V. Harizanov**, “Inductive inference systems for learning classes of algorithmically generated sets and structures,” in: *Induction, Algorithmic Learning Theory, and Philosophy*, M. Friend, N.B. Goethe, and V.S. Harizanov, editors, Springer, Dordrecht (2007), pp. 27–54.
32. M. Dabkowska, M. Dabkowski, **V. Harizanov**, and A. Sikora, “Turing degrees of nonabelian

- groups,” *Proceedings of the American Mathematical Society* 135 (2007), pp. 3383–3391.
31. W. Calvert, **V. Harizanov**, and A. Shlapentokh, “Turing degrees of the isomorphism types of algebraic objects,” *Journal of the London Mathematical Society* 73 (2007), pp. 273–286.
  30. **V. Harizanov** and R. Miller, “Spectra of structures and relations,” *Journal of Symbolic Logic* 72 (2007), pp. 324–348.
  29. M. Dabkowska, M. Dabkowski, **V. Harizanov**, J. Przytycki, and M. Veve, “Compactness of the space of left orders,” *Journal of Knot Theory and Its Ramifications* 16 (2007), pp. 257–366.
  28. **V. Harizanov** and F. Stephan, “On the learnability of vector spaces,” *Journal of Computer and System Sciences* 73 (2007), pp. 109–122, expanded version of paper 15.
  27. B. Csima, **V. Harizanov**, D. Hirschfeldt, and R. Soare, “Bounding homogeneous models,” *Journal of Symbolic Logic* 72 (2007), pp. 305–323.
  26. W. Calvert, **V. Harizanov**, J. Knight, and S. Miller, “Index sets of computable structures,” *Algebra and Logic* 45 (2006), pp. 306–325.
  25. W. Calvert, D. Cenzer, **V. Harizanov** and A. Morozov, “Effective categoricity of equivalence structures,” *Annals of Pure and Applied Logic* 141 (2006), pp. 61–78.
  24. S. Kaufmann, C. Condoravdi, and **V. Harizanov**, “Formal approaches to modality,” in: *The Expression of Modality*, W. Frawley, editor, Mouton de Gruyter, Berlin (2006), pp. 71–106.
  23. S. Goncharov, **V. Harizanov**, J. Knight, C. McCoy, R. Miller, and R. Solomon, “Enumerations in computable structure theory,” *Annals of Pure and Applied Logic* 136 (2005), pp. 219–246.
  22. S. Goncharov, **V. Harizanov**, J. Knight, A. Morozov, and A. Romina, “On automorphic tuples of elements in computable models,” *Siberian Mathematical Journal* 46 (2005), pp. 523–532 (Russian); pp. 405–412 (English translation).
  21. R. Dimitrov, **V. Harizanov**, and A. Morozov, “Dependence relations in computably rigid computable vector spaces,” *Annals of Pure and Applied Logic* 132 (2005), pp. 97–108.
  20. S. Goncharov, **V. Harizanov**, J. Knight, and R. Shore, “ $\Pi_1^1$  relations and paths through  $O$ ,” *Journal of Symbolic Logic* 69 (2004), pp. 585–611.
  19. S. Goncharov, **V. Harizanov**, J. Knight, and C. McCoy, “Relatively hyperimmune relations on structures,” *Algebra and Logic* 43 (2004), pp. 94–101.
  18. S. Goncharov, **V. Harizanov**, M. Laskowski, S. Lempp, and C. McCoy, “Trivial, strongly minimal theories are model complete after naming constants,” *Proceedings of the American Mathematical Society* 131 (2003), pp. 3901–3912.

17. **V. Harizanov**, “Turing degrees of hypersimple relations on computable structures,” *Annals of Pure and Applied Logic* 121 (2003), pp. 209–226.
16. S. Goncharov, **V. Harizanov**, J. Knight, and C. McCoy, “Simple and immune relations on countable structures,” *Archive for Mathematical Logic* 42 (2003), pp. 279–291.
15. **V. Harizanov** and F. Stephan, “On the learnability of vector spaces,” in: *Algorithmic Learning Theory*, N. Cesa-Bianchi, M. Numao, and R. Reischuk, editors, Springer-Verlag, Berlin (2002), pp. 233–247.
14. **V. Harizanov**, “Computability-theoretic complexity of countable structures,” *Bulletin of Symbolic Logic* 8 (2002), pp. 457–477.
13. **V. Harizanov**, J. Knight, and A. Morozov, “Sequences of  $n$ -diagrams,” *Journal of Symbolic Logic* 67 (2002), pp. 1227–1247.
12. **V. Harizanov**, “Relations on computable structures,” in: *Contemporary Mathematics*, N. Bokan, editor, University of Belgrade (2000), pp. 65–81.
11. **V. Harizanov**, “Effectively nowhere simple relations on computable structures,” in: *Recursion Theory and Complexity*, M.M. Arslanov and S. Lempp, editors, Walter de Gruyter, Berlin (1999), pp. 59–70.
10. **V. Harizanov**, “Turing degrees of certain isomorphic images of recursive relations,” *Annals of Pure and Applied Logic* 93 (1998), pp. 103–113.
9. **V. Harizanov**, “Pure computable model theory,” in: *Handbook of Recursive Mathematics*, vol. 1, Yu.L. Ershov, S.S. Goncharov, A. Nerode, and J.B. Remmel, editors, North-Holland, Amsterdam (1998), pp. 3–114.
8. **V. Harizanov**, “Effectively and noneffectively nowhere simple sets,” *Mathematical Logic Quarterly* 42 (1996), pp. 241–248.
7. **V. Harizanov**, “The possible Turing degree of the nonzero member in a two element degree spectrum,” *Annals of Pure and Applied Logic* 60 (1993), pp. 1–30.
6. **V. Harizanov**, M. Kummer, and J. Owings, “Frequency computations and the cardinality theorem,” *Journal of Symbolic Logic* 57 (1992), pp. 682–687.
5. **V. Harizanov**, “Some effects of Ash-Nerode and other decidability conditions on degree spectra,” *Annals of Pure and Applied Logic* 55 (1991), pp. 51–65.
4. **V. Harizanov**, “Uncountable degree spectra,” *Annals of Pure and Applied Logic* 54 (1991), pp. 255–263.
3. Z. Mijajlović and **V. Harizanov**, “Regular relations and the quantifier ‘there exists uncountably many’,” with *Zeitschrift für Mathematische Logik und Grundlagen der Mathematik* 29 (1983), pp. 151–161.

2. **V. Harizanov**, “On some finite groupoids whose equational theories are not finitely based,” in the volume: *Algebraic Conference*, K. Gilezan, editor, Mathematical Institute, Novi Sad (1982), pp. 35–38.
1. **V. Harizanov**, “On the functional equation  $f\phi f=f$ ,” *Publications de l’Institut Mathématique, Nouvelle Série* 29 (1981), pp. 61–64.

### ***Edited Books***

2. J. Chubb, A. Eskandarian, and **V. Harizanov**, editors, *Logic and Algebraic Structures in Quantum Computing*, Cambridge University Press/ASL, 336 pages, 2016.
1. M. Friend, N. Goethe, and **V. Harizanov**, editors, *Induction, Algorithmic Learning Theory, and Philosophy*, Series: Logic, Epistemology, and the Unity of Science, vol. 9, Springer, Dordrecht, 304 pages, 2007.

### ***Edited Special Issues of Journals***

7. M. Dabkowski, **V. Harizanov**, L. Kauffman, J. Przytycki, R. Sazdanovic, and A. Sikora, Eds., special issues dedicated to the 60<sup>th</sup> birthday of Jozef Przytycki, Part IV, *Journal of Knot Theory and Its Ramifications*, vol. 30, nos. 12–14, World Scientific, Singapore, 2021.
6. M. Dabkowski, **V. Harizanov**, L. Kauffman, J. Przytycki, R. Sazdanovic, and A. Sikora, Eds., special issue dedicated to the 60<sup>th</sup> birthday of Jozef Przytycki, Part III, *Journal of Knot Theory and Its Ramifications*, vol. 27, no. 3, World Scientific, Singapore, 2018.
5. M. Dabkowski, **V. Harizanov**, L. Kauffman, J. Przytycki, R. Sazdanovic, and A. Sikora, Eds., special issue dedicated to the 60<sup>th</sup> birthday of Jozef Przytycki, Part II, *Journal of Knot Theory and Its Ramifications*, vol. 26, no. 3, World Scientific, Singapore, 2017.
4. M. Dabkowski, **V. Harizanov**, J. Przytycki, R. Sazdanovic, and A. Sikora, Eds., special issue dedicated to the 60<sup>th</sup> birthday of Jozef Przytycki, Part I, *Journal of Knot Theory and Its Ramifications*, vol. 25, no. 3, World Scientific, Singapore, 2016.
3. M. Dabkowski, **V. Harizanov**, L. Kauffman, J. Przytycki, and V. Ramakrishna, Eds., *Proceedings of the Workshop on Knots and Quantum Computing*, vol. II, University of Texas at Dallas and follow up conferences, special issue of the *Journal of Knot Theory and Its Ramifications*, vol. 20, no. 1, World Scientific, Singapore, 335 pages, 2011.
2. M. Dabkowski, **V. Harizanov**, L. Kauffman, J. Przytycki, and V. Ramakrishna, Eds., *Proceedings of the on Workshop on Knots and Quantum Computing*, vol. I, University of Texas at Dallas and follow up conferences, special issue of the *Journal of Knot Theory and Its Ramifications*, vol. 19, no. 6, World Scientific, Singapore, 127 pages, 2010.
1. D. Cenzer, **V. Harizanov**, D. Marker, and C. Wood, Eds., *The Workshop on Model Theory and Computable Model Theory*, University of Florida, Gainesville, special issue of *Archive for Mathematical Logic*, vol. 48, no. 1, Springer, Berlin, 140 pages, 2009.



### ***Invited Book Reviews and AMS Notices***

5. W. Calvert, **V. Harizanov**, E. Omodeo, A. Policriti and A. Shlapentokh, “[In memory of Martin Davis](#),” to appear in the *Notices of the American Mathematical Society*.
4. **V. Harizanov**, “C. Ash and J. Knight, Computable Structures and Hyperarithmetical Hierarchy,” *Bulletin of Symbolic Logic* 3 (2001), pp. 383–385.
3. **V. Harizanov**, “S.S. Goncharov, Countable Boolean Algebras and Decidability,” *Journal of Symbolic Logic* 63 (1998), pp. 1188–1190.
2. **V. Harizanov**, “Yuri V. Matiyasevich, Hilbert’s Tenth Problem,” *Modern Logic*, International Journal for the History of Mathematical Logic, Set Theory, and Foundations of Mathematics, vol. 5 (1995), pp. 345–355.
1. **V. Harizanov**, “Douglas Hofstadter, Gödel, Escher, Bach,” *GWU Forum* (1988), pp. 46–48.

### ***Presentations by V. Harizanov of Research Papers at Conferences***

104. Invited paper “Generically computable Abelian groups and isomorphisms,” Special Session on Inverse Problems, *Spring Western Sectional Meeting of the American Mathematical Society*, San Francisco State University, San Francisco, May 4–5, 2024.
103. Contributed paper “Generically computable structures,” jointly with W. Calvert and D. Cenzer, *European Summer Meeting of the Association for Symbolic Logic*, University of Milan, Italy, June 5–9, 2023.
102. Invited paper “Asymptotic density, computability, and structures,” Special Session on Inverse Problems, *Fall Western Sectional Meeting of the American Mathematical Society*, California State University, Fresno, May 6–7, 2023.
101. Invited paper “Orders, topology, and computability,” Computability session, *South Eastern Logic Symposium (SEALS)*, University of Florida, Gainesville, March 4–5, 2023.
100. Invited paper “Effective ultrapowers,” AMS Special Session on Definability, Computability, and Model Theory dedicated to Gerald Sacks, *Joint Math Meetings*, Boston, January 4–7, 2023.
99. Plenary paper “Orders on magmas, their spaces, and complexity,” *Knots in Washington*, GWU, December 9–11, 2022.
98. Invited paper “Densely computable structures and isomorphisms,” *SIU Probability and Statistics Conference*, Special Session on Logic and Probability, Carbondale, Ill, October 28–30, 2022.
97. Invited paper “Cohesive powers of computable structures,” parts I–II, jointly with K. Srinivasan, Special Session on Inverse Problems, *Fall Western Sectional Meeting of the*

- American Mathematical Society*, University of Utah, Salt Lake City, October 22–23, 2022.
96. Plenary paper “Complexity, structure and language,” conference *Models and Computability* (Mathematics of Julia Knight), University of Notre Dame, September 30–October 2, 2022.
  95. Invited paper “Effective ultraproducts of structures,” Computability session, *South Eastern Logic Symposium* (SEALS), University of Florida, Gainesville, March 5–6, 2022.
  94. Invited paper “Generically and coarsely computable structures and isomorphisms,” international hybrid meeting *Algorithmic Presentations in Mathematics*, Sirius Mathematics Center, Sochi, Russia, November 8–12, 2021.
  93. Invited paper “Effective ultrapowers of directed graphs,” parts I–II, jointly with K. Srinivasan, Special Session on Inverse Problems, *Fall Western Sectional Meeting of the American Mathematical Society*, University of New Mexico (virtual), October 23–24, 2021.
  92. Plenary paper “Computable and decidable categoricity,” *Mal’cev Meeting* (hybrid), Novosibirsk, Russia, September 20–24, 2021.
  91. Invited paper “Approximately computable structures,” international hybrid meeting *Applied Category Theory Graph-Operad-Logic* (in memory of Zbyszek Oziewicz), UNAM, Mexico, August 24–27, 2021.
  90. Invited paper “Densely Computable Structures,” international meeting on *Computability Theory*, Oberwolfach Mathematical Institute, Germany (hybrid), April 26–May 1, 2021.
  89. Invited paper “On the isomorphism problem,” ASL/AMS Special Session on Computability Theory and Effective Mathematics,” *Joint Math Meetings*, Washington DC (virtual), January 6–9, 2021.
  88. Invited paper “Orderable quandles” Special Session on Inverse Problems, *Fall Western Sectional Meeting of the American Mathematical Society*, University of Utah (virtual), October 24–25, 2020.
  87. Invited paper “Orderable magmas,” Computability session, *South Eastern Logic Symposium* (SEALS), University of Florida, Gainesville, February 29–March 1, 2020.
  86. Invited paper “Computable structure theory: work of J.B. Remmel,” *Logical Foundations of Computer Science*, Deerfeld Beach, Florida, January 4–7, 2020.
  85. Invited paper “Degrees of decidable and computable categoricity,” Scientific Session on Computability Theory, 2019 *Canadian Mathematical Society Winter Meeting*, Toronto, December 6–9, 2019.
  84. Invited paper “Computable isomorphism problem,” Special Session on Inverse Problems, *Fall Western Sectional Meeting of the American Mathematical Society*, University of California, Riverside, November 9–10, 2019.

83. Invited paper “Approximately computable equivalence structures,” jointly with W. Calvert and D. Cenzer, *European Summer Meeting of the Association for Symbolic Logic*, Special Session on Computability, Prague, Czech Republic, August 11–16, 2019.
82. Invited paper “Cohesive powers, linear orders, and definability,” *SIU Pure Mathematics Conference*, Southern Illinois University, Carbondale, May 14–15, 2019.
81. Invited paper “Computable structures, effective products, and definability,” Special Session on Computability Theory, *Spring Eastern Sectional Meeting of the American Mathematical Society*, University of Connecticut, Hartford, April 13–14, 2019.
80. Invited paper “Complexity of problems in computable structure theory,” Special Session on Computability, Complexity and Learning, *Spring Central and Western Joint Sectional Meeting of the American Mathematical Society*, University of Hawaii at Manoa, Honolulu, March 22–24, 2019.
79. Invited paper “Effective ultraproducts and applications,” joint AMS-ASL Special Session on Definability and Decidability Problems in Number Theory, *Joint Math Meetings*, Baltimore, January 16–19, 2019.
78. Invited paper “Effectively categorical structures,” AMS Special Session on Recent Advances and Trends in Computable Structure Theory (in honor of J. Remmel), *Joint Math Meetings*, Baltimore, January 16–19, 2019.
77. Contributed paper “Effective powers of computable structures,” *Computability in Europe*, Kiel, Germany, July 30–August 3, 2018.
76. Invited paper “Automorphism groups of substructure lattices,” *Workshop on Computability Theory and Its Applications*, University of Waterloo, Canada, June 4–8, 2018.
75. Invited paper “Building models as products of structures,” Special Session on Inverse Problems, *Meeting of the American Mathematical Society*, Portland State University, Portland, OR, April 14–15, 2018.
74. Invited paper “Effective products of computable structures,” Computability session, *SouthEastern Logic Symposium (SEALS)*, University of Florida, Gainesville, March 3–4, 2018.
73. Plenary paper “The automorphisms of the lattice of  $\mathbf{x}$ -computably enumerable vector spaces,” *Workshop on Computable Structures and Reverse Mathematics*, Institute for Mathematical Sciences, National University of Singapore, September 11–15, 2017.
72. Invited tutorial (two lectures) on computable structure theory, *11<sup>th</sup> Panhellenic Logic Symposium*, Delphi, Greece, July 12–16, 2017.
71. Invited paper “Structure of orders on structures,” Special Session on Inverse Problems, *Meeting of the American Mathematical Society*, Washington State University, Pullman, WA, April 22–23, 2017.

70. Invited tutorial (three lectures) on computable structure theory, *North American Annual Meeting of the Association for Symbolic Logic*, Boise State University, Idaho, March 20–23, 2017.
69. Invited paper “Orders on computable structures,” *Computability and Complexity Symposium*, Raunoti, New Zealand, January 5–8, 2017.
68. Invited paper “Khisamiev functions and algebraic structures,” Special Session on Effective Mathematics in Discrete and Continuous Worlds, *Meeting of the American Mathematical Society*, University of St. Thomas, Minneapolis, October 28–30, 2016.
67. Invited paper “Limitwise monotonic functions and  $\Sigma_1^0$  and  $\Pi_1^0$  equivalence structures,” 9<sup>th</sup> *International Workshop on Computability Theory*, Ghent, Belgium, July 4–5, 2016.
66. Invited paper “Spaces of orders on magmas,” 19<sup>th</sup> *Annual Conference for the Consortium for Orders in Algebra and Logic*, Penn State Behrend, Erie, PA, June 2016.
65. Invited paper “Turing degree spectra of structures,” Special Session on Computability, *Association for Symbolic Logic North American Annual Meeting*, University of Connecticut, Storrs, May 2016.
64. Invited paper “Transforming structures into structures,” Special Session on Inverse Problems, *Meeting of the American Mathematical Society*, University of Utah, Salt Lake City, April 2016.
63. Refereed paper “Degrees of the isomorphism types of structures,” *International Conference on Computability, Complexity and Randomness*, University of Hawaii, Honolulu, January 2016.
62. Plenary paper “Computationally enumerable sets and vector spaces with thin complements,” *New England Recursion and Definability Seminar*, Assumption College, Worcester, MA, October 2015.
61. Invited paper “Computable categoricity and Scott families,” Special Session on Computability Theory and Applications, *Meeting of the American Mathematical Society*, Loyola University, Chicago, October 2015.
60. Contributed paper, “Algorithmic complexity of orders on groups,” jointly with M. Dabkowski and J. Chubb, *European Summer Meeting of the Association for Symbolic Logic*, Helsinki, Finland, August 2015.
59. Contributed paper “Complexity of orders on groups,” annual *European Summer Meeting of the Association for Symbolic Logic*, Helsinki, Finland, August 2015.
58. Invited paper “Limit-computable categoricity of computable structures,” research conference *Sets and Computations*, National University of Singapore, April 2015.
57. Plenary special session (double time) paper “Quasimaximal spaces,” Special Session on the

- Inverse Problems and Related Mathematical Methods in Physics, *Meeting of the American Mathematical Society*, University of Nevada, Las Vegas, April 2015.
56. Invited paper “Orbits of maximal vector spaces,” *SouthEastern Logic Symposium (SEALS)*, Computability session, University of Florida, Gainesville, February 2015.
  55. Invited paper “Maximal vector spaces,” *Knot Theory and Its Application to Physics and Quantum Computing*, Dallas, Texas, January 2015.
  54. Invited paper “Interaction of computability theory and computable algebra,” Special Session on Computability Theory, *Canadian Mathematical Society Winter Meeting*, Hamilton, Ontario, December 2014.
  53. Plenary paper “Computable mathematics,” *The Mathematical Association of America Meeting*, Maryland-District of Columbia-Virginia Section, Bowie State University, November 2014.
  52. Invited paper “Coding information into orders on groups,” Special Session on the Inverse Problem and Other Mathematical Methods Applied in Physics and Related Sciences, *Meeting of the American Mathematical Society*, Albuquerque, New Mexico, April 2014.
  51. Plenary special session (double time) paper “Notions of degree spectra,” American Mathematical Society Special Session on Computability in Geometry and Topology, *Annual Joint Mathematics Meetings*, Baltimore, January 2014.
  50. Invited paper “ $\Sigma_1^0$  and  $\Pi_1^0$  equivalence structures,” Special Session on Computability Across Mathematics, *Meeting of the American Mathematical Society*, St. Louis, Missouri, October 2013.
  49. Invited paper “Effective categoricity of injection structures,” *Sy-Friedman Symposium*, Kurt Gödel Research Center for Mathematical Logic, University of Vienna, Austria, July 2013.
  48. Invited paper “Complexity of orders on residually nilpotent groups,” Special Session on Computability and Complexity in Discrete and Continuous Worlds, *Meeting of the American Mathematical Society*, Ames, Iowa, April 2013.
  47. Invited paper “Application of computability theory to a problem in topology,” Special Session on Themes in Applied Mathematics, *Meeting of the American Mathematical Society*, Boulder, Colorado, April 2013.
  46. Invited paper “Complexity of orders on algebraic structures,” joint American Mathematical Society/Association for Symbolic Logic Special Session on Effective Algebra and Model Theory, *Annual Joint Mathematics Meetings*, San Diego, January 2013.
  45. Invited paper “Injections, orbits, and complexity,” Isaac Newton Institute *Workshop on the Incomputable*, Kavli Royal Society International Centre, Chichley Hall, United Kingdom, June 2012.

44. Plenary paper “Structures, theories, and diagrams,” conference *Definability in Computable Structures*, University of Chicago, May 2012.
43. Invited paper “Different approaches to orders on groups,” Special Session on Mathematics Applied in the Sciences: From Statistics to Topology, *Meeting of the American Mathematical Society*, Washington DC, March 2012.
42. Invited paper “ $\Pi_1^0$  equivalence structures and their isomorphisms,” international meeting on *Computability Theory*, Oberwolfach Mathematical Institute, Germany, February 2012.
41. Invited paper “Computability theoretic complexity of isomorphisms of countable structures,” Special Session on Category Theory in Graphs, Geometry and Inverse Problems, *Meeting of the American Mathematical Society*, University of Utah, Salt Lake City, October 2011.
40. Plenary paper “ $\Delta_2^0$  isomorphisms of effective equivalence structures,” *Mal'cev Meeting (International Conference on Algebra, Mathematical Logic, and Applications)*, Novosibirsk, Russia, October 2011.
39. Invited paper “When orders on a group form the Cantor set,” *Workshop on Computability Theory*, Centre de Recerca Matemàtica, Barcelona, Spain, July 2011.
38. Invited paper “Orders on structures and structure of orders,” *Computability in Europe*, Special Session Computability in Analysis, Algebra, and Geometry, Sofia, Bulgaria, June 2011.
37. Invited lecture series: “Introduction to computable model theory,” and “computability theoretic complexity of isomorphisms of computable structures,” *Ninth International Workshop on Category Theory and Graph Operad Logic*, University of Texas at San Antonio, March 2011.
36. Invited paper “Computationally enumerable and co-computationally enumerable equivalence structures,” international *Workshop on Computability Theory*, Paris, France, July 2010.
35. Invited paper “Degree spectra and the jump hierarchy,” SouthEastern Logic Symposium –SEALS, University of Florida, Gainesville, February 2010.
34. Plenary paper “Four notions of degree spectra,” *Logic Colloquium – European Summer Meeting of the Association for Symbolic Logic*, Sofia, Bulgaria, August 2009.
33. Invited paper “Computability and orders on structures,” *Workshop on Computability, Reverse Mathematics and Combinatorics*, Banff International Research Station, Alberta, Canada, December 2008.
32. Invited paper “Computable properties of abelian  $p$ -groups,” *Meeting of the American Mathematical Society*, Special Session on Computability Theory and Effective Algebra, Wesleyan University, Middletown, Connecticut, October 2008.

31. Invited paper “Effective categoricity of equivalence structures and abelian  $p$ -groups,” *North American Annual Meeting of the Association for Symbolic Logic*, University of California, Irvine, March 2008. Abstract in the *Bulletin of Symbolic Logic* 14 (2008), pp. 423.
30. Invited paper “Spaces of orders,” *Workshop on Knots and Quantum Computing* (NSF-funded), University of Texas at Dallas, December 2007.
29. Invited paper “Computable algebra,” Special Session on Advances in Algorithmic Methods for Algebraic Structures, *Meeting of the American Mathematical Society*, Murfreesboro, Tennessee, November 2007.
28. Plenary paper “Back and forth through computable model theory,” *Winter Meeting of the Association for Symbolic Logic*, New Orleans, January 2007. Abstract in the *Bulletin of Symbolic Logic* 13 (2007), pp. 376.
27. Invited paper “Coding structures into structures,” Special Session on Computability Theory in Honor of Manuel Lerman’s Retirement, *Meeting of the American Mathematical Society*, University of Connecticut, Storrs, October 2006.
26. Invited paper “Strong degree spectra of relations,” *Meeting of the American Mathematical Society*, Special Session on Model Theory and Computability, University of Notre Dame, April 2006.
25. Invited paper “Orders on computable groups,” 12<sup>th</sup> *SouthEastern Logic Symposium – SEALS*, University of Florida, Gainesville, March 2006.
24. Invited paper “Computable models, computability, and enumerations,” *Workshop on Classification of Countable Models*, University of Notre Dame, May 2005.
23. Invited paper “Degrees of structures,” 11<sup>th</sup> *SouthEastern Logic Symposium – SEALS*, University of Florida, Gainesville, April 2005.
22. Invited paper “Effectively and relatively effectively categorical structures,” Special Session on Computability Theory and Applications, *Meeting of the American Mathematical Society*, Northwestern University, Evanston, October 2004.
21. Plenary paper “Effectiveness in algebraic structures,” *Association for Symbolic Logic North American Annual Meeting*, Carnegie-Mellon University, Pittsburgh, May 2004. Abstract in the *Bulletin of Symbolic Logic* 11 (2005), pp. 95–96.
20. Invited paper “Kleene’s  $O$ , Harrison orderings, and Turing degree spectra,” 10<sup>th</sup> *SouthEastern Logic Symposium – SEALS*, University of Florida, Gainesville, March 2004.
19. Contributed paper “Inductive inference machines for mathematical structures,” 12<sup>th</sup> *International Congress of Logic, Methodology and Philosophy of Science*, Oviedo, Spain, August 2003.
18. Invited paper “Degrees of the isomorphism types of countable structures,” Special Session on

Computability Theory and Effective Mathematics, *Association for Symbolic Logic North American Annual Meeting*, University of Illinois at Chicago, June 2003. Abstract, jointly with M. Dabkowski and M. Dabkowska, in the *Bulletin of Symbolic Logic* 10 (2004), p. 130.

17. Refereed paper “On the learnability of vector spaces,” jointly with F. Stephan, *13<sup>th</sup> International Conference on Algorithmic Learning Theory*, Lübeck, Germany, November 2002.
16. Invited paper “Principal filters of the lattice of computably enumerable vector spaces,” Special Session on Effectiveness Questions in Model Theory, *Meeting of the American Mathematical Society*, University of Wisconsin, Madison, October 2002.
15. Invited paper “Complexity of diagrams of countable structures,” Special Session on Computability Theory with Applications, *Annual Meeting of the American Mathematical Society*, San Diego, January 2002.
14. Invited paper “Immune relations on computable structures,” Special Session on Computability Theory, *Millennium Association for Symbolic Logic North American Annual Meeting*, University of Illinois, Urbana-Champaign, June 2000. Abstract in the *Bulletin of Symbolic Logic* 6 (2000), pp. 370.
13. Invited paper “Definability and algorithmic properties of structures,” *Mid-Atlantic Mathematical Logic Symposium*, University of Maryland, College Park, April 2000.
12. Invited paper “Computably enumerable relations on computable structures,” Special Session on Computability, *Meeting of the American Mathematical Society*, University of Florida, Gainesville, March 1999.
11. Invited paper “Nowhere simplicity, Turing degrees, and splittings,” *Mid-Atlantic Mathematical Logic Symposium*, American University, Washington, DC, April 1998.
10. Invited paper “Uncountably many isomorphic copies of a computable relation,” *International Workshop on Recursion Theory and Complexity Theory*, Kazan, Russia, July 1997.
9. Contributed paper “Intrinsically  $\Delta_2^0$  relations in computable structures,” annual *European Summer Meeting of the Association for Symbolic Logic*, University of Leeds, United Kingdom, July 1997. Abstract in the *Bulletin of Symbolic Logic* 4 (1998), pp. 89–90.
8. Invited paper “Nowhere simple sets,” international meeting *Recursion Theory*, Oberwolfach Mathematical Institute, Germany, February 1996.
7. Invited paper “Turing degrees of certain isomorphic images of recursive relations,” Special Session on Recursive and Feasible Mathematics, *Annual Meeting of the American Mathematical Society*, Orlando, Florida, January 1996.
6. Invited paper “Frequency computable sets, their classes, and generalizations,” Special Session on Computability Theory, annual *European Summer Meeting of the Association for Symbolic Logic*, Haifa, Israel, August 1995. Abstract in the *Bulletin of Symbolic Logic* 3



(1997), pp. 99–100.

5. Plenary paper “Recursive model theory: Examining computability in the theory of theories,” *Winter Meeting of the Association for Symbolic Logic*, San Francisco, California, January 1995.
4. Contributed paper “Frequency computations,” jointly with M. Kummer, J. Owings, and F. Stephan, *Association for Symbolic Logic North American Annual Meeting*, Duke University, Durham, March 1992. Abstract in the *Journal of Symbolic Logic* 58 (1993), pp. 373–374.
3. Contributed paper “Two-element Turing degree spectrum,” annual *European Summer Meeting of the Association for Symbolic Logic*, West Berlin, Germany, July 1989. Abstract in the *Journal of Symbolic Logic* 57 (1992), pp. 300.
2. Contributed paper “Some cardinality and complexity properties of a Turing degree spectrum,” *Annual Meeting of the American Mathematical Society*, Atlanta, Georgia, January 1988.
1. Contributed paper “Łoś’s theorem for ultraproducts of models with monotone quantifiers,” annual *European Summer Meeting of the Association for Symbolic Logic*, Marseille, France, August 1981. Abstract in the *Journal of Symbolic Logic* 48 (1983), pp. 1212.

### ***Invited Presentations by V. Harizanov at Other Universities and Institutes***

70. “Orders on computable structures and their Turing degrees,” *Logic and Computation Seminar* (DDC Day), Department of Mathematics, University of Pennsylvania, October 8, 2023.
69. “Cohesive powers of computable structures,” *Logic Seminar*, Department of Pure Mathematics, University of Waterloo, Canada, August 15, 2023.
68. “Orderable magmas,” *Mathematical Sciences Department Colloquium*, University of Texas at Dallas, November 10, 2022.
67. “Computability and definability in computable model theory,” *Logic Seminar*, University of Maryland, College Park, October 11, 2022.
66. “Densely computable structures and isomorphisms,” part I, *Decidability, Definability and Computability in Number Theory*, Seminar, MSRI, Berkeley, July 20, 2022.
65. “Computability theory and the isomorphism problem,” *Computational Logic Seminar*, Vienna University of Technology, Vienna, Austria, May 4, 2022.
64. “Computable isomorphism problem,” *Computability Theory and Applications Online Seminar*, March 29, 2022.
63. “Complexity of the isomorphism problem,” *Mathematics Colloquium*, University of Florida, Gainesville, March 4, 2022.

62. "Computability theory and automorphisms of lattices of substructures," *Online Logic Seminar* (from Southern Illinois University), May 6, 2021.
- 61 "Effective ultrapowers," *Decidability, Definability and Computability in Number Theory*, part 1 (virtual), Main Seminar, MSRI, Berkeley, October 2020.
60. "Arithmetically categorical structures," *Logic Seminar*, Department of Pure Mathematics, University of Waterloo, Canada, June 2019.
59. "Effective ultrapowers," *Logic Seminar*, Department of Mathematics, University of Maryland, College Park, April 2019.
58. "Structure and complexity of orders on structures," *Mathematics Colloquium*, Southern Illinois University, Carbondale, April 2018.
57. "Maximal computably enumerable sets and vector spaces," *Research Seminar* of the Kurt Gödel Research Center for Mathematical Logic, University of Vienna, Austria, December 2014.
56. "Orders on groups, their spaces, and complexity," *Research Seminar* of the Kurt Gödel Research Center for Mathematical Logic, University of Vienna, Austria, March 2014.
55. "Recursive mathematics," *Mathematics Colloquium*, Department of Mathematics and Informatics, University of Sofia, Bulgaria, July 2013.
54. "Effective structures and complexity of their isomorphisms," *Mathematics Colloquium*, University of Florida, Gainesville, October 2012.
53. "Turing and beyond," *Applied Information Sciences Lecture Series*, Johns Hopkins University, Applied Physics Lab, February 2012.
52. "Computably enumerable and co-computably enumerable equivalence structures," *Research Seminar* of the Kurt Gödel Research Center for Mathematical Logic, University of Vienna, Austria, November 2011.
51. "Groups, orders, trees, and paths," *Logic Seminar*, University of Maryland, College Park, April 2011.
50. "Orders on structures," *Mathematics Colloquium*, George Mason University, April 2011.
49. "Effective equivalence structures and their isomorphisms," *Connecticut Logic Seminar*, Wesleyan University, November 2010.
48. "Orders on groups," *Logic Seminar*, University of Maryland, College Park, April 2010.
47. "Constructions of modern computability theory," *Mathematics Colloquium*, University of Texas at Dallas, March 2010.
46. "Computable structures, effective categoricity, and Scott families," *Logic Seminar*,

Department of Mathematics, MIT, October 2009.

45. "Priority Methods," *Women in Mathematics Lecture Series*, MIT, October 2009.
44. "Orderable groups," *Logic Workshop*, CUNY Graduate Center, New York, May 2009.
43. "Effective Scott families of Abelian  $p$ -groups," *Logic Seminar*, University of Maryland, College Park, November 2008.
42. "Effective categoricity of structures," *Logic Seminar*, University of Florida, Gainesville, November 2008.
41. "Orderable groups and their spaces of orders," *Mathematics Colloquium*, University of Florida, Gainesville, November 2008.
40. "From algorisms to computability theory," *Mathematics Colloquium*, University of Texas at Dallas, September 2008.
39. "Turing, Gödel, and the algorithmic method," *Mathematics Colloquium*, East Carolina University, April 2008.
38. "Effective categoricity of equivalence structures," *Logic Seminar*, University of Maryland, College Park, April 2008.
37. "Algorithms, undecidability, and incompleteness," *Mathematics Colloquium*, Howard University, November 2007.
36. "Turing computability in theories and structures," *Mathematics Colloquium*, Department of Pure Mathematics, University of Waterloo, Canada, November 2006.
35. "Embedding fields into nilpotent groups," *Logic Workshop*, CUNY Graduate Center, New York, October 2006.
34. "Inductive inference of classes of computably enumerable vector spaces," *Logic Seminar*, Cornell University, December 2004.
33. "Intrinsically  $\Sigma_\alpha^0$  relations on computable structures," *Logic Seminar*, Cornell University, November 2004.
32. "Scott families and complexity of isomorphisms," *Logic Seminar*, Western Illinois University, October 2004.
31. "Systems that learn algorithmically generated languages and structures," *Mathematics Colloquium*, Western Illinois University, October 2004.
30. "Computable model theory," *Logic Seminar*, University of Chicago, May 2004.
29. "Using computable algebra in theoretical computer science," *Logic Seminar*, University of

Notre Dame, April 2004.

28. "Computable algebra and algorithmic learning theory," *Mathematics Colloquium*, East Carolina University, March 2004.
27. "Isomorphic images of relations on countable structures," *Logic Seminar*, University of Maryland, College Park, March 2004.
26. "Learning classes of algebraic structures from positive and negative information," *Computer Science Colloquium*, University of Delaware, May 2003.
25. "Algorithmic complexity of countable models," *Mathematical Logic and Theoretical Computer Science Seminar*, Heidelberg University, Germany, November 2002.
24. "Computability-theoretic complexity of theories, structures, and relations," *Mathematics Colloquium*, Western Illinois University, October 2002.
23. "Post-type properties of relations on structures," *Logic Seminar*, Western Illinois University, October 2002.
22. "Turing degrees of structures," *Logic Seminar*, Sobolev Institute of Mathematics, Russia, July 2002.
21. "Hyperarithmetical and nonhyperarithmetical relations on structures," *Logic Seminar*, University of Chicago, May 2002.
20. "Intrinsic complexity of relations on structures," *Southern Wisconsin Logic Colloquium*, University of Wisconsin, Madison, March 2002.
19. "Turing complexity of mathematical structures and their relations," *Complexity Theory Seminar*, Computer Science Department, University of Maryland, College Park, May 2001.
18. "Turing degrees of hypersimple relations on computable structures," *Southern Wisconsin Logic Colloquium*, University of Wisconsin, Madison, November 2000.
17. "Simplicity and nowhere simplicity of relations on structures," *Logic Seminar*, University of Notre Dame, April 2000.
16. "Computably enumerable relations on computable models," *Southern Wisconsin Logic Colloquium*, University of Wisconsin, Madison, October 1999.
15. "Computability-theoretic properties of relations on computable models," *Logic Seminar*, Cornell University, April 1998.
14. "Algorithmic properties of models," *Mathematics Colloquium*, East Carolina University, December 1997.
13. "Algorithmic properties of mathematical structures," *Mathematics and Statistics Colloquium*, University of Maryland Baltimore County, September 1996.

12. “Computability in mathematical structures,” *Logic Seminar*, Institut für Logik, Komplexität und Deduktionssysteme, Karlsruhe University, Germany, January 1996.
11. “Hilbert’s tenth problem,” *Mathematics Faculty/Student Colloquium*, University of Maryland, College Park, January 1995.
10. “Recursive homogeneous structures,” *Logic Seminar*, University of Maryland, College Park, April 1991.
9. “Turing degrees of computational difficulty,” *Mathematics Colloquium*, George Mason University, March 1990.
8. “Effective mathematics,” *Mathematics Colloquium*, University of Maryland, College Park, January 1990.
7. “An introduction to recursive model theory,” *Logic Seminar*, University of Maryland, College Park, April 1988.
6. “Algorithms on mathematical structures,” *Mathematics and Computer Science Colloquium*, DePaul University, Chicago, 1987.
5. “Degree spectra of relations,” *Mathematics Colloquium*, San Jose State University, 1987.
4. “Relations on recursive structures,” *Mathematics and Statistics Colloquium*, Loyola University, Chicago, 1987.
3. “Effective mathematics,” *Mathematics Colloquium*, Oberlin College, 1987.
2. “Degree spectra of relations,” *Mathematics Colloquium*, Florida International University, Miami, 1987.
1. “Degree spectrum of a recursive relation on a recursive structure,” *Logic Seminar*, University of Illinois, Urbana-Champaign, February 1987.

### ***External Research Grants***

17. PI for NSF research grant FRG – Collaborative Research: *Definability and Computability over Arithmetically Significant Fields*, July 15, 2022–June 30, 2025.
16. PI, Simons Foundation, Collaboration Grants for Mathematicians, “Topics in computable structure theory,” September 1, 2021–August 31, 2026. (Terminated grant due to NSF funding.)
15. PI, Simons Foundation, Collaboration Grants for Mathematicians, “Computability in algebraic structures,” September 1, 2016–August 31, 2022.
14. PI with (PIs H. Barcelo, MSRI Berkeley, and R. Miller, Queens College), NSA, “Connections workshop: definability and computability in number theory,” 2020–21.

Declined due to covid.

13. Co-PI (with PI: M. El-Banna, and co-PIs: L. Posey and C. Pintz, J. Clarke, and S. O'Brien), National League of Nursing, Dorothy Otto Research Award, "Mindset-Enhanced E-Learning to Improve Medication Calculation," July 1, 2017–June 30, 2019.
12. PI for the individual NSF research grant DMS-1202328: "Topics in computable structure theory," July 2012–June 2016.
11. Co-PI (with PI: J. Przytycki, and co-PIs: R. Sazdanovic, A. Shumakovitch and Hao Wu) for the NSF conference grant DMS-1543617: "Knots in Washington XLI: Conference Series on Knot Theory and its Ramifications," September 2015–August 2019.
10. Senior personnel (with PI: J. Knight, U. of Notre Dame) for the binational research NSF grant DMS-1600625, with Russia/Kazakhstan/Bulgaria: "Collaboration in computability," May 2016–April 2022.
9. Co-PI (with PI: J. Przytycki, and co-PIs: A. Shumakovitch and Hao Wu) for the NSF conference grant DMS-1137422: "Knots in Washington – Conferences on Knot Theory and its Ramifications," September 2011–August 2015.
8. Senior personnel (with PI: J. Knight, U. of Notre Dame) for the binational research NSF grant DMS-1101123, with Russia/Kazakhstan and Bulgaria: "Collaboration in computability," May 2011–April 2016.
7. PI for the individual NSF research grant DMS-0904101: "Topics in computable mathematics," July 2009–June 2012.
6. PI for the individual NSF research grant DMS-0704256: "Computability theory and algebraic structures," July 2007–March 2010.
5. Senior personnel (with PI: J. Knight, U. of Notre Dame) for the binational with Russia/Kazakhstan research NSF grant DMS-0554841: "Collaboration in computability," April 2006–March 2011.
4. PI for the individual NSF research grant DMS-0502499: "Computability theory and algebraic structures," July 2005–June 2007.
3. Co-PI (with M. Arslanov, S. Badaev, D. Cenzer, S. Goncharov, J. Knight, A. Morozov, M. Peretyat'kin, R. Solomon) for the binational with Russia/Kazakhstan research NSF grant DMS-0075899: "Computability and effective constructions in mathematics," PI: Steffen Lempp, University of Wisconsin, 2000–2005.
2. PI for the individual NSF Research Grant DMS-9210443: "Frequency approach to approximating algorithms," August 1992–January 1994.
1. Numerous research conference participation grants.

## ***GWU Research Grants***

20. “Dense computability of algebraic structures and their transformations,” CCAS Impact Award, Spring 2023.
19. “Application of Gold-Putnam learning paradigm to mathematical structures,” Columbian College Facilitating Fund, summer 2018.
18. “Turing degree spectra of structures,” Columbian College Facilitating Fund, summer 2017.
17. “Turing complexity of orders on computable structures,” Columbian College Facilitating Fund, summer 2016.
16. “Turing complexity of mathematical objects,” Columbian College Facilitating Fund, summer 2015.
15. Center and Institute Facilitating Fund (CIFF) award for the Center for Quantum Computing, Information, Logic and Topology, GWU Office for Research, July 2013–June 2015.
14. “Computable structures, their isomorphisms and relations,” Columbian College Facilitating Fund, summer 2013.
13. “Computability theoretic properties of relations on structures,” Columbian College Facilitating Fund, summer 2012.
12. GWU Research Enhancement Fund award for Quantum Computation, Complexity, and Information group, with J. Przytycki (Mathematics), Ali Eskandarian (Physics) and Bill Parke (Physics), GWU Office for Research, 2009–11.
11. “Theory of mathematical orders at the frontier of logic and topology,” with J. Przytycki, Columbian College Research Award, summer 2008.
10. “A new application of computability theory to topology,” University Facilitating Fund Research Award, summer 2005.
9. “The mathematics and philosophy of induction,” with M. Friend (Philosophy Department), Dilthey Faculty Award for Interdisciplinary Research, summer 2003.
8. “Application of computability theory to language learning,” University Facilitating Fund Research Award, summer 2002.
7. “Forcing and computable models,” University Facilitating Fund Research Award, summer 1996.

6. “Recursive model theory,” University Facilitating Fund Research Award, summer 1994.
5. “Frequency computation theory,” University Facilitating Fund Research Award, summer 1992.
4. “Degrees of learnability,” Junior Scholar Incentive Award, summer 1991.
3. “Interactive language learning by inductive inference machines,” University Facilitating Fund Research Award, summer 1990.
2. “The effect of isomorphic transformations on computable sets,” University Facilitating Fund Research Award, summer 1988.
1. “Finitely many Turing degrees of infinitely many isomorphic transformations,” Junior Scholar Incentive Award, summer 1989.

### ***Awards and Honors***

9. *The George Washington Award*, an excellence in student life award for exceptional contributions to the university, Division for Student Affairs, GWU, 2020.
8. *Oscar and Shoshana Trachtenberg Prize for Faculty Research*, George Washington University, 2016.
7. *Dean’s Research Chair*, Columbian College of Arts and Sciences, GWU, 2015–18 and 2019–22.
6. *Faculty Authors Book Signing Reception*, Gelman Library, GWU, February 2008.
5. *Columbian Research Fellowship*, Columbian College of Arts and Sciences, GWU, 2004–05.
4. *The 1995–96 Award for the Exemplary Paper in Natural, Mathematical and Biological Sciences*, Columbian College of Arts and Sciences, GWU.
3. *Pedagogical Research and Innovative Developments in Education (PRIDE) Award*, University Teaching Center, GWU, 1992.
2. *Marie Christine Kohler Fellowship*, University of Wisconsin, Madison, 1983–87.
1. *P.E.O. International Peace Scholarship*, 1983–85.

### ***Short-Term Research Visits***

Institute of Discrete Mathematics and Geometry, Vienna University of Technology, 2016 and 2022.

University of Texas at Dallas, regular visitor 2008–present.

University of Florida, Gainesville, regular visitor 2004–present.



Kurt Gödel Research Center for Mathematical Logic, University of Vienna, Austria, regular visitor 2009–16.

National University of Singapore, 2015 and 2017.

University of Sofia, Bulgaria, 2013.

City University of New York Graduate Center, 2009.

University of Notre Dame, regular visitor during 2000–2010.

MIT, 2009.

East Carolina University, 2008.

University of Waterloo, Canada, 2006.

University of Chicago, 2004.

Cornell University, 2004.

Sobolev Institute of Mathematics, Russian Academy of Sciences, Novosibirsk, 2002 and 2011.

Heidelberg University, Germany, 2002.

University of Wisconsin, Madison, 2000 and 2002.

### ***Dissertation Advisor at GWU***

16. Henry Klatt, Department of Mathematics, PhD student.

15. Philip White, Department of Mathematics, PhD candidate.

14. Keshav Srinivasan, Department of Mathematics, PhD candidate.

13. Dario Verta, *Computability Theory: Countable Magmas and Their Properties*, Department of Mathematics, PhD, 2023. (Recipient of NSF Graduate Research Fellowship, 2019–22.)

12. Iva Bilanovic, *Detecting Properties of Algorithmically Presented Algebraic and Relational Structures*, Department of Mathematics, PhD, 2020.

11. Trang Ha, Department of Mathematics, *On Algorithmic Properties of Computable Magmas*, Department of Mathematics, PhD, 2018.

10. Hakim Walker, *Computable Isomorphisms of Directed Graphs and Trees*, Department of Mathematics, PhD, 2017. Recipient of National Physical Science Consortium Fellowship for 2012–13. Recipient of GW Philip J. Amsterdam Graduate Teaching Award for 2016–17. (Teaching position at Harvard University.)

9. Leah Marshall, *Computability-Theoretic Properties of Partial Injections, Trees, and Nested Equivalences*, Department of Mathematics, PhD, 2015. (Civil servant at U.S. Census Bureau, Suitland, Maryland.) Recipient of Lambert Endowment Fellowship of Mathematics for 2012–13.

8. Kai Maeda, *Non-Associative Models and Their Richter's Degrees*, Department of Mathematics, PhD, 2013. (Research position at the Okinawa Institute of Science and

Technology, Japan.)

7. Jennifer Chubb, Department of Mathematics, *Ordered Structures and Computability*, PhD, 2009. (Tenured associate professor at the University of San Francisco.)
6. Sarah Pingrey, Department of Mathematics, *Strong Degree Spectra of Relations*, PhD, 2008. (Was tenure-track assistant professor at the American University in Cairo, Egypt; currently on maternity leave with the sixth child, teaching online.)
5. Eric Ufferman, Department of Mathematics, *Structures and Partial Computable Automorphisms*, PhD, 2006. (Was visiting assistant professor at St. Olaf College, Minnesota, and postdoc at the National University of Mexico; currently instructor at Virginia Tech.)
4. Malgorzata Dabkowska, Department of Mathematics, *Turing Degree Spectra of Groups and Their Spaces of Orders*, PhD, 2006. (Senior lecturer at the University of Texas at Dallas.)
3. Amir Togha, Department of Mathematics, *On Automorphisms of Structures in Logic and Orderability of Groups in Topology* (co-advised with Ali Enayat, American University), PhD, 2004. (Tenured associate professor at BCC, City University of New York.)
2. Rumen Dimitrov, *Computably Enumerable Vector Spaces, Dependence Relations, and Turing Degrees*, Department of Mathematics, PhD, 2002. (Tenured professor at the Western Illinois University.)
1. Timothy McNicholl, *The Inclusion Problem for Generalized Frequency Classes*, Department of Mathematics, PhD, 1995. (Tenured professor at Iowa State University.)

### ***Other Dissertation Committees***

23. Luke MacLean, *To Infinity and Beyond: Computable Structure Theory and Transfinite Jumps in the Turing and Enumeration Degrees*, Department of Pure Mathematics, PhD, University of Waterloo, Canada, 2023.
22. Gabriel Montoya Vega, *A Historical Exploration of Knot Theory, Khovanov Homology, and Framing Changes of Links and Skein Modules*, PhD, GWU, 2022.
21. Dionne Ibarra, *Framed Links in 3-Manifolds, Its Applications and Algebraic Approaches to Knot Theory*, Department of Mathematics, PhD, GWU, 2022.
20. Rhea Palak Bakshi, *Skein Modules, Skein Algebras, and Their Ramifications*, Department of Mathematics, PhD, GWU, 2021.
19. Michael Deveau, *Computability Theory and Some Applications*, Department of Pure Mathematics, PhD, University of Waterloo, Canada, 2019.
18. Sujoy Mukherjee, *On Skein Modules and Homology Theories Related to Knot Theory*,

- Department of Mathematics, PhD, GWU, 2019.
17. Harpreet Bedi, *Cohomology of Line Bundles with Rational Degree*, Department of Mathematics, PhD, GWU, 2017.
  16. Seung Yeop Yang, *Khovanov Homology, Distributive Structure Homology and Applications to Knot Theory*, Department of Mathematics, PhD, GWU, 2017.
  15. Mohammad Obiedat, *Incrementally Sorted Lattice Data Structure*, Department of Computer Science, PhD, School of Engineering and Applied Science, GWU, 2015.
  14. Jing Wang, *Homology of Small Categories and Its Applications*, Department of Mathematics, PhD, GWU, 2015.
  13. Erblin Mehmetaj, *On the  $r$ -Continued Fraction Expansion of Real Numbers*, Department of Mathematics, PhD, GWU, 2014.
  12. Cynthia Merrick, *Some Properties of Simplicial Geometries*, Department of Mathematics, PhD, George Mason University, 2013.
  11. Tyler White, *Topologically Mixing Tilings of  $\mathbb{R}^2$  by a Generalized Substitution*, Department of Mathematics, PhD, GWU, 2012.
  10. Frederick Nelson, *A Geometric Approach to Rations of  $\pi/3$ -Congruent Numbers*, Department of Mathematics, PhD, Howard University, 2011.
  9. Sara Quinn, *Algorithmic Complexity of Algebraic Structures*, Department of Mathematics, PhD, University of Notre Dame, 2008.
  8. Tetyana Andress, *The Spectrum and the First Čech Cohomology of a One Dimensional Tiling Dynamical System*, Department of Mathematics, PhD, GWU, 2007.
  7. Maciej Niebrzydowski, *Some Applications of Quandles and Their Homology to the Geometry of Knots*, Department of Mathematics, PhD, GWU, 2007.
  6. Wesley Calvert, *Algebraic Structure and Computable Structure*, Department of Mathematics, PhD, University of Notre Dame, 2005.
  5. Ahmed Al-Hosni, *Using the Lebesgue Space Filling Curve for Manipulation of Two-Dimensional Arrays*, Department of Computer Science, PhD, GWU, 2004.
  4. Mietek Dabkowski, *Cubic Skein Modules and Burnside Groups*, Department of Mathematics, PhD, GWU, 2003.
  3. Charles McCoy, *Relativization, Categoricity, and Dimension*, Department of Mathematics, PhD, University of Notre Dame, 2000.

2. Georgia Martin, *Cantor Singletons, Rank-Faithful Trees, and Other Topics in Recursion Theory*, Department of Mathematics, PhD, University of Maryland, College Park, 1993.
1. Mathematical advisor for the interdisciplinary dissertation of Massoud Moussavi, *A Six-Valued Logic for Modeling Incomplete Knowledge*, Department of Electrical Engineering and Computer Science, PhD, GWU, 1991.

### ***Supervision of Undergraduate Students***

7. Faculty mentor for senior honors thesis and Enosinian Scholars Honors Program thesis “Quantum neural networks” by Jacob Learned, Spring 2016. He won the second prize for his poster in the category of mathematics and physical sciences at GW Research Day on March 29, 2016.
6. Faculty mentor for senior honors thesis “Grover’s search algorithm quantum speed-up” by Mariel Supina, Spring 2016. (PhD student at UC Berkeley.) Faculty mentor for GW *Luther Rice Collaborative Fellowship* to Mariel Supina for the project “Classical and quantum algorithms: analysis and comparison,” 2014–15. Supina presented a poster “The power of quantum computing algorithms” at the *Annual Nebraska Conference for Undergraduate Women in Mathematics*, Lincoln, NE, January 23–25, 2015.
5. Faculty mentor for the senior honors thesis “Orders on structures” by James Clark, 2013–14.
4. Faculty mentor for GW *Luther Rice Collaborative Fellowship* and senior honors thesis for Milica Taskovic for the project “Axiom of choice across mathematical theories,” 2013–14. Taskovic presented a poster at the *National Conference on Undergraduate Research* at the University of Kentucky in April 3–5, 2014. She won the first prize for her poster in the category of natural sciences (physical science) at *GW Research Day* on April 1, 2014. (Currently a PhD student at the University of Texas at Austin.)
3. Faculty mentor for the senior honors thesis “Turing categories” by Andrew Hirsch, Spring 2013. (Currently a doctoral student at Cornell University.)
2. Faculty mentor for the research poster “Simple structures with complicated properties” by Hakim Walker, lead author (PhD student), James Clark (junior), Peter DiNicola (Master’s student), and Caprice Stanley (senior); won the third prize in the category of natural sciences at *GW Research Day* on April 2, 2013.
1. Faculty mentor for the senior honors thesis “Categorical semantics of quantum protocols” by Clarke Smith and for his GW *George Gamow Undergraduate Research Fellowship*, 2011–12. (PhD 2019, Yale, currently postdoctoral fellow at Yale University.)

### ***Sponsoring Research Visitors***

29. Sergei Goncharov, Russian Academy of Sciences and Novosibirsk State University, Novosibirsk, Summer 2001, March 2015, February 2019.

28. Jennifer Chubb, University of San Francisco, 2017–18.
27. Alexandra Soskova, University of Sofia, Bulgaria, March 2012, March 2015, March 2018.
26. Andrei Morozov, Sobolev Institute of Mathematics and Novosibirsk State University, Russia, December 2000, Spring semester 2005, March 2008, March 2015, March 2018, February 2020.
25. Dan Turetsky, Kurt Gödel Research Center, University of Vienna, Austria, March 2015.
24. Rumen Dimitrov, Western Illinois University, Fall 2012, Fall 2013, 2014, 2015, March 2018, February 2020.
23. Maria Soskova, University of Sofia, Bulgaria, March and March 2015.
22. Wesley Calvert, University of Notre Dame, April 2005, March 2010, May 2011, April 2014, March 2015, and December 2016.
21. Timothy McNicholl, Iowa State University, November 2016.
20. Johanna Franklin, Hofstra University, New York, March 2016.
19. Russell Miller, Queens College and Graduate Center, CUNY, 2004, 2012, 2014, 2015.
18. Alexandra Shlapentokh, East Carolina University, April 2014, February 2020.
17. Mietek Dabkowski, University of Texas at Dallas, Fall 2013.
16. William de la Cruz, Center of Research and Advanced Studies of IPN, Mexico City, Fall semester 2011.
15. Bob Coecke, University of Oxford, December 2010 and May 2011.
14. Samson Abramsky, University of Oxford, May 2011.
13. Zbigniew Oziewicz, National Autonomous University of Mexico, Mexico City, April/May 2011.
12. Peter Selinger, Dalhousie University, Canada, March 2011.
11. Dmitry Trushin, Moscow State University, Russia, March 2011.
10. Peter Shor, MIT, March 2010.
9. Vadim Puzarenko, Sobolev Institute of Mathematics and Novosibirsk State University, Russia, March 2010.
8. Sara Quinn, University of Notre Dame, March 2008.
7. Andrei Frolov, Kazan State University, Russia, February 2007.
6. John Chisholm, Western Illinois University, 2005–06.
5. Timothy McNicholl, University of Dallas, Fall Semester 2004.
4. Barbara Csima, Cornell University, June 2004.
3. Frank Stephan, Heidelberg University, Germany, January 2002.
2. Steffen Lempp, University of Wisconsin, Summer 2001.
1. Charlie McCoy, University of Wisconsin, Summer 2001.

***Revised or Newly Designed Courses Taught at George Washington by V. Harizanov***

(U=undergraduate; G=graduate; WID=writing in the discipline; \* indicates a newly designed course)

37. (G) \*Math 6720 – Graduate topics in logic: *Computable algebra*, Spring 2024.
36. (G) \*Math 6720 – Graduate topics in logic: *Algorithmic complexity theory*, Fall 2021.
35. (G) \*Math 6720 – Graduate topics in logic: *Algorithmic method and famous problems*, Fall 2017 and Spring 2021.
34. (G) \*Math 6720 – Graduate topics in logic: *Classical and computable model theory*, Spring 2015 and Spring 2020.
33. (G) \*Math 6720 – Graduate topics in logic: *Computability theory*, Fall 2019.
32. (G) \*Math 6720 – Graduate topics in logic: *Set theory*, Fall 2006, Fall 2015, and Spring 2019.
31. (U) \*Math 1000 – Dean’s Seminar: *Language and logic*, Fall 2018.
30. (G) \*Math 6720 – Graduate topics in logic: *Algorithmic learning theory*, Fall 2011 and Spring 2018.
29. (G) \*Math 6720 – Graduate topics in logic: *Turing degrees*, Spring 2017 and Spring 2023.
28. (U) \*Math 4981 – Topics in mathematics: *Classical and quantum computational complexity*, Spring 2014.
27. (G) \*Math 6720 – Graduate topics in logic: *Current topics in computability theory and applications*, Fall 2010 and Fall 2013.
26. (G) \*Math 6720 – Graduate topics in logic: *Ordinals, definability, and computability*, Spring 2004 and Fall 2012.
25. (G) \*Math 6720 – Graduate topics in logic: *Computable structure theory*, Spring 1999 and Spring 2011.
24. (G) Math 6710 (revised): *Mathematical logic*, Fall 1988–present.
23. (U) \*Math 3740 (W): *Computational complexity*, Spring 1990–present.
22. (U) Math 3730 (W) (revised): *Computability theory*, Spring 1992–present.
21. (U) Math 3720 (revised): *Axiomatic set theory*, Spring 1990–present.
20. (U) Math 3710 (revised): *Introduction to mathematical logic*, Spring 1988–present.
19. (G) \*Math 272–Graduate topics in logic: *Algorithms and mathematics (Computable mathematics)*, Fall 2007, Spring 2013, and Fall 2023.

18. (G) \*Math 272—Graduate topics: *Algorithmic methods*, Spring 2007.
17. (U) \*Dean’s Seminar for Freshmen: *Turing machines, Chomsky languages, digital and quantum computing*, Spring 2007.
16. (U) \*Dean’s Seminar for Freshmen: *Mathematics of the infinite*, Fall 2006.
15. (U) \*Dean’s Seminar for Freshmen: *Is reasoning computable?*, Spring 2006.
14. (G) \*Math 6720—Graduate topics in logic: *Model theory*, Fall 2005.
13. (U) \*Dean’s Seminar for Freshmen: *Mathematical logic, languages, and learning*, Spring 2004.
12. (G) \*Math 272—Graduate topics: *Computability theory and applications to mathematical structures*, Fall 2003.
11. (G) \*Math 272—Graduate topics: *Algorithmic learning. Gödel incompleteness*, Fall 2002.
10. (G) \*Math 272—Graduate topics: *Frequency computations. Computable algebra*, Spring 2001.
9. (G) \*Math 274: *Computational complexity* for the Computational Sciences Master’s Program, Spring 2000.
8. (G) \*Math 272—Graduate topics: *Independence results in set theory (The forcing method)*, Spring 1995, Fall 1998.
7. (G) \*Math 272—Graduate topics: *Models, algorithms, and applications*, Fall 1997.
6. (G) \*Math 272—Graduate topics: *Recursion theory: hierarchies, oracles and degrees*, Spring 1996.
5. (G) \*Math 272—Graduate topics: *Current topics in effective model theory*, Fall 1994.
4. (U) \*Honors 24: *Mathematical theory of languages II*, Spring 1991 and Spring 1992.
3. (U) \*Honors 23: *Mathematical theory of languages I*, Fall 1990 and Fall 1991.
2. (G) \*Math 272—Graduate topics: *NP-completeness. Multi-valued logic*, Fall 1989.
1. (G) \*Math 272—Graduate topics: *Incompleteness of formal systems. Turing degrees*, Spring 1989.

### ***Reading Courses at George Washington***

79. (G) *Forcing in computability theory*, Fall 2023.
78. (UG) *Compactness in logic*, Fall 2023.
77. (G) *Ash-Nerode method*, Spring 2022 and 2022–23.
76. (G) *Index sets of structures*, Fall 2021.
75. (G) *Definability and computability*, Fall 2021.
74. (G) *Effective ultraproducts*, Spring 2021 and Fall 2021.
73. (G) *Models and hyperarithmetical hierarchy*, Spring 2021.
72. (G) *Interpreting algebraic structures*, Fall 2019.
71. (G) *Classifying problems in groups*, Fall 2017.
70. (G) *Definability and computability*, Spring 2017.
69. (G) *Free groups and index sets*, Fall 2016.
68. (UG) *Topics in quantum computing*, Fall 2015.
67. (UG) *Topics in neural networks*, Fall 2015.
66. (G) *Scott families and isomorphisms*, Fall 2015.
65. (G) *Orders on magmas*, Fall 2015.
64. (G) *Computable categoricity of graphs*, Fall 2014 and Spring 2015.
63. (UG) *Orders on magmas*, Fall 2013 and Spring 2014.
62. (G) *Effective categoricity of structures*, Fall 2013 and Spring 2012.
61. (UG) *Axiom of choice*, Fall 2013 and Spring 2014.
60. (UG) *Turing categories*, Spring 2013.
59. (G) *Structure of Turing degrees*, Spring 1991, Spring 2010, and Fall 2012.
58. (UG) *Tensor category theory*, Fall 2012.
57. (UG) *Quantum linguistics*, Spring 2012.



56. (UG) *Models of set theory*, Spring 2012.
55. (UG) *Category theory*, Spring 2012.
54. (G) *Algorithmic learning theory*, Fall 2011.
53. (G) *Complexity of properties on non-associative structures*, Fall 2011.
52. (G) *Turing degrees of structures*, Spring 2011.
51. (G) *Orders on groups*, Fall 2010.
50. (G) *First-order structures*, Fall 2010.
49. (G) *Topics in computability*, Fall 2009.
48. (G) *Advanced topics in logic*, Spring 2009.
47. (G) *Topics in set theory*, Spring 2008.
46. (UG) *P versus NP*, Spring 2008.
45. (G) *Algorithmic complexity theory*, Spring 2008.
44. (G) *Topics in model theory*, Fall 2007 and Spring 2001.
43. (G) *Computable linear orderings*, Fall 2007.
42. (UG) *Topics in computability*, Summer 2007.
41. (G) *Degree spectra of relations*, Spring 2007.
40. (UG) *Topics in logic and computing*, Spring 2007.
39. (G) *Complexity of orders on computable groups*, Fall 2006.
38. (G)  $\Pi_1^0$  *classes*, Spring 2006.
37. (G) *Linear orders and interval trees*, Spring 2006.
36. (G) *Weak truth-table degree spectra*, Fall 2005
35. (G) *Many-one degrees and spectra*, Fall 2005.
34. (UG) *Math and philosophy of first-order logic*, Fall 2005.

33. (G) *Partial automorphism semigroups*, Spring 2005.
32. (G) *Computability and Boolean algebras*, Spring 2005.
31. (G) *Maximal relations*, Fall 2004.
30. (G) *Realizing and omitting types*, Fall 2004.
29. (G) *Truth-table degree spectra*, Fall 2004.
28. (G) *Deductive, inductive, and logical reasoning*, Spring 2004.
27. (G) *Analytical and hyperarithmetical hierarchies*, Spring 2004.
26. (G) *Uncountably categorical theories*, Fall 2003.
25. (G) *Automorphisms of computably enumerable vector spaces*, Fall 2003.
24. (G) *Large cardinals and model theory*, Spring 2003.
23. (G) *Prime, saturated, and homogeneous models*, Fall 2002.
22. (G) *Recursive groups and fields*, Spring 2002.
21. (G) *Advanced topics in logic*, Spring 2002.
20. (G) *Combinatorial group theory*, Fall 2001.
19. (G) *Topics in computability theory*, Fall 2000.
18. (G) *Recursive vector spaces*, Spring 1998.
17. (G) *Ash's labeling systems*, Fall 1997.
16. (G) *Set-theoretic forcing*, Spring 1997.
15. (G) *Computable algebra*, Spring 1997.
14. (G) *Computable model theory*, Fall 1996.
13. (G) *Constructions by finitely and transfinitely many workers*, Fall 1994.
12. (G) *Generalized frequency classes*, Spring 1994.
11. (G) *Frequency computations and bounded queries*, Fall 1993.

10. (G) *Decidability of the inclusion problem*, Fall 1993.
9. (G) *Advanced topics on frequency classes*, Spring 1993.
8. (G) *Monster priority methods*, Fall 1992.
7. (G) *Recursive mathematics*, Summer 1992.
6. (G) *Frequency computations*, Spring 1992.
5. (G) *Semirecursive and selective sets*, Fall 1991.
4. (G) *Advanced recursion theory*, Summer 1991.
3. (G) *Cardinal and ordinal arithmetic*, Spring 1991.
2. (G) *Finite and infinite injury priority methods*, Fall 1990.
1. (G) *Set theory*, Fall 1990.

### ***Professional Affiliations***

American Mathematical Society  
 Association for Symbolic Logic  
 Association for Women in Mathematics  
 American Association for the Advancement of Science  
 Computability in Europe Association

### ***V. Harizanov's English Translations in Research Journals of Russian Papers***

9. M.V. Zakhar'yashchev, "Modal companions of superintuitionistic logics: syntax, semantics, and preservation theorems," *Mathematics of the USSR Sbornik* 68 (1991), pp. 277–289.
8. A.I. Tsitkin, "Towards the question of an error in a well-known paper by M. Wajsberg," *Selecta Mathematica Sovietica* 7 (1988), pp. 23–36.
7. V.P. Orevkov, "Theorems with very short proofs can be strengthened," *Selecta Mathematica Sovietica* 7 (1988), pp. 37–38.
6. I.D. Zaslavsky, "The realization of three-valued logical functions through recursive and Turing operators," *Selecta Mathematica Sovietica* 7 (1988), pp. 15–22.
5. K.Zh. Kudaibergenov, "On questions of Keisler and Morley," *Doklady Mathematics* 34, (1987), pp. 482–483.
4. N.V. Petri, "Unsolvability of the recognition problem for annihilating iterative networks," *Selecta Mathematica Sovietica* 6 (1987), pp. 355–363.

3. N.K. Zamov, “The resolution method without skolemization,” *Doklady Mathematics* 35 (1987), pp. 399–401.
2. D.P. Skvortsov, “Some propositional logics connected with Yu. T. Medvedev’s concept of types of information,” *Selecta Mathematica Sovietica* 5 (1986), pp. 371–377.
1. L.L. Esakia, “On the variety of Grzegorzcyk algebras,” *Selecta Mathematica Sovietica* 3, (1983/84), pp. 343–366.

### ***Other Service to Research Community***

59. Co-organizer (with W. Calvert and A. Shlapentokh), Joint Math Meetings, *Computable Mathematics*, AMS Special Session dedicated to Martin D. Davis, San Francisco, January 3–6, 2024.
58. Co-organizer (with B. Mazur, J. Park, F. Pop, K. Rubin and A. Shlapentokh), virtual FRG Workshop on *Definability, Decidability and Computability over Arithmetically Significant Fields*, June 21–22, 2023.
57. Association for Symbolic Logic Executive Committee and Council, January 2022–present.
56. Lead co-organizer (with A. Shlapentokh) of the virtual program *Definability, Decidability and Computability in Number Theory*, Part 1, Mathematical Sciences Research Institute, Berkeley, Fall 2020. Co-organizer (with B. Mazur, R. Miller, J. Pila, T. Scanlon and A. Shlapentokh) of Part 2 program, July 18–August 12, 2022.
55. Co-organizer (with J. Freitag), North American Annual Meeting Special Session *Aspects of Logic and Machine Learning*, Cornell University, April 7–10, 2022.
54. Scientific Committee member for the XIX *Latin American Symposium on Mathematical Logic* (SLALM), Costa Rica, July 26–30, 2022.
53. Referee for the conference and its proceedings, *Computer Science Logic*, February 13–16, 2023, University of Warsaw, Poland.
52. Program Committee member for the Second and Third *Workshop on Digitalization and Computable Models* (WDCM-2019). Novosibirsk, Russia, July 20–24, 2020; Novosibirsk and Kazan, June 28–July 2, 2021.
51. Program Committee member for *Mal’cev Meeting*, Sobolev Institute of Mathematics, Novosibirsk, Russia, November 16–20, 2020.
50. Co-organizer of the American Institute of Mathematics Workshop *Definability and Decidability Problems in Number Theory*, San Jose, May 6–10, 2019.
49. Chair of the Program Committee for the *Winter Meeting of the Association for Symbolic Logic* (with *Joint Math Meetings*), Baltimore, January 18–19, 2019.

48. Program Committee member for 2018 *Logicum Colloquium* in Bayreuth, Germany, September 14–16, 2018.
47. Reviewer for the Natural Sciences and Engineering Research Council of Canada.
46. Reviewer and panel member for the National Science Foundation research grants.
45. Reviewer for the Simons Foundation grants.
44. Reviewer for Mardsen Fund research grants, Royal Society of New Zealand.
43. Judge for the Mathematical Association of America poster session competition for undergraduate students at the Joint Math Meetings in San Diego, January 2018.
42. Co-organizer (with R. Miller and A. Shlapentokh) of the American Mathematical Society Meeting Special Session *Computability in Algebra and Number Theory*, College of Charleston, Charleston, SC, March 10–12, 2017.
41. Member of the Program Committee for the 12<sup>th</sup> meeting *Computability in Europe: Pursuit of the Universal*, Paris, France, June 27–July 1, 2016.
40. Referee for the conference and its proceedings, 30th Annual ACM/IEEE *Symposium on Logic in Computer Science*, July 6–10, 2015, Kyoto, Japan.
39. Co-organizer (with R. Dimitrov and R. Miller) of the American Mathematical Society Meeting Special Session *Computable Structure Theory*, Georgetown University, Washington, DC, March 2015.
38. Co-organizer (with M. Dabkowski, T. Hagge, V. Ramakrishna R. Sazdanovic, and A. Sikora) of the NSF-supported *Conference on Knot Theory and its Applications to Physics and Quantum Computing*, University of Texas at Dallas, January 6–9, 2015.
37. Co-organizer (with J. Przytycki, Y. Rong, R. Sazdanovic, A. Shumakovitch, and H. Wu) of the bi-annual NSF-supported GWU conference *Knots in Washington*, Spring 2010–2021.
36. Referee for the conference and its proceedings, Joint Annual Conference in *Computer Science Logic* and ACM/IEEE Symposium on *Logic in Computer Science*, July 14–18, 2014, Vienna, Austria.
35. Judge for the Association for Women in Mathematics poster session competition for graduate students at the 2014 Joint Math Meetings in Baltimore, and 2018 Joint Math Meetings in San Diego.
34. Co-organizer (with W. Calvert, D. Cenzer and J. Franklin) of the joint American Mathematical Society/Association for Symbolic Logic Special Session *Logic and Computability*, Joint Mathematics Meetings, Baltimore, January 2014.

33. Member of the Program Committee for the European Summer Meeting of the Association for Symbolic Logic, Évora, Portugal, July 22–27, 2013. Co-organizer (with J. Costa) of the Special Session *Computability*.
32. Co-organizer (with D. Cenzer, U. of Florida, and R. Miller, CUNY) of the American Mathematical Society Special Session *Computable Mathematics* (in honor of Alan Turing), GW, March 17–18, 2012.
31. Guest editor for the *Journal of Knot Theory and Its Ramifications*, 2007–2011 and 2014–2021.
30. Referee for the conference and its proceedings (Lecture Notes in Computer Science, Springer), *Computability in Europe*, 2011–present.
29. Referee for the CRM *Proceedings & Lecture Notes*, American Mathematical Society, 2011.
28. Organizer of the Annual Meeting of the Association for Symbolic Logic, GWU, Washington, DC, March 17–20, 2010.
27. Co-organizer (with J. Przytycki, GWU) of the American Mathematical Society Special Session *Orderings in Logic and Topology*, Annual Joint Mathematics Meetings, Washington, DC, January 5–8, 2009.
26. Association for Symbolic Logic representative to the American Association for the Advancement of Science, Section on Mathematics, 2008–2014.
25. Guest editor for the journal *Archive for Mathematical Logic* 2006–2009.
24. Outside reviewer for tenure and promotion, graduate faculty appointments, and faculty scholarship awards.
23. Association for Women in Mathematics panel “Critical career decision stages: Research and funding opportunities,” AWM events in conjunction with the Joint Mathematics Meetings, New Orleans, January 2007.
22. Referee for *Collected Works of Andrzej Mostowski*, North-Holland, 2007.
21. Reviewer for CUNY Research Foundation.
20. Organizing and Program Committee member for *Model Theory and Computable Model Theory Meeting*, University of Florida Special Year in Logic, 2006–07.
19. Chair of the Program Committee, Association for Symbolic Logic Winter Meeting, San Antonio, Texas, January 2006.
18. Referee for the Proceedings of the NSF-funded Vaught meeting *Classification of Countable*

*Models*, Notre Dame Journal of Formal Logic, 2006.

17. Referee for a special issue *Advances in Logic* of the series *Contemporary Mathematics*, American Mathematical Society, 2006.
16. Association for Symbolic Logic Nominating Committee member for the Executive Committee positions and Council positions, 2005.
15. Reference writer for the *University Faculty Award*, Natural Sciences and Research Council of Canada, 2005.
14. Program Committee member for the Association for Symbolic Logic Winter Meeting, Phoenix, Arizona, January 2004.
13. Co-organizer (with D. Cenzer, Univ. of Florida) of the American Mathematical Society Special Session *Computability and Models*, Annual Joint Mathematics Meetings, Baltimore, January 2003.
12. Organizer of the Special Session *Computable Model Theory*, Association for Symbolic Logic Winter Meeting, Washington, DC, January 2000.
11. Program Committee member for the Association for Symbolic Logic Winter Meeting, Washington, DC, January 2000. Committee on Local Arrangements member for the Annual Joint Mathematics Meetings.
10. Taught course on *Set Theory* for the national GW Summer Program for Women in Mathematics, Summer 1998.
9. Organizer of the American Mathematical Society Special Session *Computable Mathematics and Its Applications*, Annual Joint Mathematics Meetings, Baltimore, January 1998.
8. Referee for the Association of Symbolic Logic European Summer Meeting volume *Logic Colloquium '97*.
7. Referee for the Proceedings of the 7<sup>th</sup> Annual Conference *Computational Learning Theory '94*.
6. Co-organizer (with J. Owings, Univ. of Maryland) of the Special Session *Pure and Applied Recursion Theory* at the Meeting of the American Mathematical Society, Washington, DC, April 1993.
5. Co-organizer of and speaker for the Washington Area Recursion Theory Seminar – WARTS, 1988–1996.
4. Translator of Russian research papers for the journal *Selecta Mathematica Sovietica*.

3. Translator of Russian research papers for the American Mathematical Society (published in *Soviet Mathematics Doklady* and *Math USSR Sbornik*).
2. Reviewer for the International Science Foundation long-term research grants.
1. Referee for the journals *Algebra and Logic*, *American Mathematical Monthly*, *Annals of Pure and Applied Logic*, *Archive for Mathematical Logic*, *Bulletin of Symbolic Logic*, *Canadian Journal of Mathematics*, *Computability, Information and Computation*, *Information Processing Letters*, *Journal of Symbolic Logic*, *Notre Dame Journal of Formal Logic*, *Proceedings of the American Mathematical Society*, *SIAM Journal of Computing*, *Theoretical Computer Science*, *Transactions in Computational Logic*, and *Transactions of the American Mathematical Society*.

### ***Service to George Washington***

78. University Faculty Senate Committee on Appointment, Salary and Promotion Policies, 2020–present.
77. Faculty adviser of the GW Association of Women in Mathematics Student Chapter, 2019–present.
76. University Seminar Computability, Complexity and Algebraic Structure organizer, 2023–present.
75. CCAS Tenure and Promotion Committee, 2020.
74. CCAS representative for the University Research Ecosystem Review, 2018–19.
73. Math Department Newsletter Committee, 2018–21.
72. Organizer of the Mathematics Department Logic Seminar, 1996–2017, 2021–23.
71. University Seminar Logic Across Disciplines organizer, 2017–21.
70. University Faculty Senate Research Committee, 2015–19.
69. Mathematics Department Graduate Committee chair, 2013–14 and 2017–18.
68. Columbian College Research Committee, 2015–18.
67. Mathematics Department Hiring Committee chair for a tenure-track faculty position in pure math, 2015–17.
66. Mathematics Department Bylaws Committee chair, 2015–17.
65. Columbian College Undergraduate Studies Committee, 2012–15.



64. Mathematics Department Colloquium co-organizer, Spring 2015, Fall 2015, 2016–20.
63. Mathematics Department Diversity and Inclusion Committee, Fall 2015.
62. Mathematics Department Tenure and Promotion Committee, 2014–15.
61. Mathematics Department Graduate Committee, 1994–95, Spring 2001, 2002–04, 2006–07, 2012–14.
60. Organizer of the quantum computing seminar and workshops, Mathematics Department and Physics Department, 2009–present.
59. University Faculty Senate Committee on Libraries, 1991–95, 1998–99, 2001–15, 2017–present.
58. Mathematics Department undergraduate teaching assistant program coordinator, 2011–12.
57. Tenure-Track Faculty Hiring Committee in observational astrophysics, GW Department of Physics, 2011–12.
56. University Research and Instructional Technology Committee, 2009–11.
55. University Committee on Research, 2008–11.
54. Departmental undergraduate mathematics major advisor, 2009–11.
53. Coordinator for mathematics credit transfers to GWU, 2009–11.
52. Mathematics department library representative, 1993, 2009–11.
51. Mathematics Department Undergraduate Committee, 2007–08. 2011–12.
50. Columbian College of Arts and Sciences Dean’s Council, 2005–08.
49. Faculty coordinator for Mathematics Graduate Student Seminar, 2006–08.
48. Presented research poster “Computable Mathematics,” Research Gallery: President Knapp Inauguration Week Research Day, November 14, 2007.
47. Mathematics Department Colloquium Committee, 2006–07.
46. Honors Quantitative Seminar Development Team, University Honors Program, 2006–07.
45. Mathematics Department Tenure-Track Faculty Position Search Committee, 2006–07.
44. Gave lecture “Quantum Computing,” Mathematics Initiative Spring Symposium, Columbian College of Arts and Sciences, January 26, 2007.

43. Organizer of the Mathematics Department Interdisciplinary Lecture Series, 2005–06.
42. Speaker at the GWU Mathematics Colloquium launching Columbian College initiative “Mathematics across Disciplines,” May 4, 2006.
41. Chair of the Academic Program Review Committee for the English Department, 2005–06.
40. Mathematics Department Outside Chair Search Committee, 2005–06.
39. University Faculty Senate Dispute Resolution Committee, 1997–2006.
38. Columbian Research Fellows Lecture “Algorithms and oracles in mathematical theories and models,” Columbian College of Arts and Sciences, April 2005.
37. Columbian College Committee on Bylaws, 2004–05.
36. Member of the Columbian Research Fellowship Selection Committee, Columbian College of Arts and Sciences, 2005.
35. Coordinator for the Mathematics Department graduate student admissions, 2003–04.
34. Luther Rice Fellowship Panel, Columbian College of Arts and Sciences, Spring 2004.
33. Summer Program for Women in Mathematics speaker “Hilbert’s Tenth Problem: from Diophantus to Matiyasevich,” July 2002.
32. Mathematics Department Search Committee, Spring 2002.
31. Coordinator for the Mathematics Department transfer credit and exams for credit/waiver, 1998–00, 2001–02.
30. Summer Program for Women in Mathematics speaker “Quantum computing,” July 2000.
29. Chair of the Mathematics Department Undergraduate Committee, Spring 2000.
28. Mathematics Department Undergraduate Committee, 1998–00.
27. Director of the Math Lab, Spring 2000.
26. Coordinator of the GW mathematics placement exams, Summer 2000.
25. Columbian College Committee for Academic Review of the Department of Economics, 1999–00.
24. Faculty Senate Committee on Faculty Development and Support, 1998–00.

23. Faculty Senate Committee on Athletics and Recreation, 1997–99.
22. Senate liaison to the University Committee on the Status of Women Faculty and Librarians, 1998–99.
21. Organizer of the Mathematics Department Colloquium, 1996–98.
20. Co-organizer of the Mathematics Department Graduate Student Seminar, 1989–95, 1996–98.
19. Mathematics Department Personnel and Administration Committee, 1997–98.
18. Columbian College Committee for Academic Reviews of the 700 Series, 1997–98.
17. Summer Program for Women in Mathematics (national program for undergraduate seniors at GWU) speaker “Effectiveness in mathematical structures,” July 1997.
16. Exhibitor at the GWU Scholars Expo, March 1997.
15. GWU academic mentor and logic instructor for Jacob Lurie, Montgomery Blair High School student and the first prize winner of the 1996 Westinghouse Science Talent Search.
14. Coordinator for the Mathematics Department graduate admissions, 1996.
13. Graduate student advising coordinator, 1994–95.
12. Mathematics Department Search Committee for a tenure-track faculty position in topology, 1994–95.
11. Representative of the Mathematics Department for the Howard Hughes Proposal of the Columbian College, 1993.
10. GWU Cybernetics Committee, 1993–94.
9. Admissions Program Faculty Network member, 1992–93.
8. GWU Teaching Network member, 1992–93.
7. Reviewer of the applications for the admissions to the University Honors Program, 1991–93.
6. Faculty Committee for the University Honors Program, 1991–92.
5. Columbian College Student/Faculty Advisory Council, 1991–92.
4. Search Committee for the University Honors Program Director, 1992.
3. Demonstrator of mathematical software for GWU Mathematics Awareness Week in 1990,

and at the Himmelfarb Library Fair *InfoOptions for the 1990's*.

2. Speaker for and member of the Mathematics Department Colloquium Committee, 1988–91.
1. Mathematics Department committees on discrete math, library, graduate program, textbooks, curriculum, self-study, and faculty search, 1987–92.