# Mohamed Elhamdadi, Ph.D.

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## Education

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| Ph.D. of Mathematics, University of Nice-Sophia Antipolis (France) | June 1996 |
| M.S. of Mathematics, University of Nice-Sophia Antipolis | June 1991 |
| B.S. of Mathematics, University of Nice-Sophia Antipolis | June 1990 |
| Associate degree of Mathematics, University of Fez (Morocco) | June 1989 |

## Professional Experience

- Full Professor, University of South Florida, Tampa, FL (2020- Present)
- Associate Professor, University of South Florida, Tampa, FL (2013 - 2020)
- Assistant Professor, University of South Florida, Tampa, FL (2007 - 2013)
- Instructor, University of South Florida, Tampa, FL (2000 - 2007)
- Adjunct Professor, University of South Florida, Tampa, FL (1999 - 2000)
- Visiting Scientist, International Centre for Theoretical Physics, Trieste, Italy (1999 - 1999)
- Adjunct Professor, University of South Florida, Tampa, FL (1997 - 1998)
- Visiting Researcher, Purdue University at Indianapolis, Indianapolis, Indiana (1996 - 1997)
- Research and Teaching Assistant, University of Nice-Sophia Antipolis, France (1991–1996)

## Service

*Comittees*:

- University of South Florida, School of Natural Sciences and Mathematics (SNSM) Tenure and Promotion Committee, 2020-2022
- Co-chair of the American Mathematical Society Library Committee, 2019-2022
- American Mathematical Society Library Committee, 2018-2019
- University of South Florida, Mathematics Department, Lecture Series Committee 2019-2020
- University of South Florida, College of Arts and Sciences, Library Committee 2016-2017

- University of South Florida, Mathematics Department, Lecture Series Committee 2017-2018
- University of South Florida, Mathematics Department, Chair of Advisory Committee 2016—2017
- University of South Florida, Mathematics Department, Advisory Committee 2015—2016
- University of South Florida, Mathematics Department, Graduate Admissions Committee 2014-2015
- University of South Florida, Mathematics Department, Computer Committee 2013—2014

*Referee for mathematical research journals:*

- Advances in Mathematics
- Algebraic and Geometric Topology
- Mathematics of Computations
- Journal of Knot Theory and its Ramifications
- Journal of Algebra
- Proccedings of the American Mathematical Society
- Topology and its Applications
- Journal of Pure and Applied Algebra
- Osaka Journal of Mathematics
- Advances in Applied Clifford Algebras
- Algebra Universalis
- Korean Journal of Mathematics
- Discrete Mathematics
- Fundamenta Mathematicae
- Journal of Geometry and Physics
- Journal of Mathematical Physics
- Journal of Algebra and its Applications
- Journal of the Australian Mathematical Society

- Missouri Journal of Mathematical Sciences
- Comptes Rendus de l'Académie des Sciences.
- New York Journal of Mathematics
- São Paulo Journal of Mathematical Sciences
- Houston Journal of Mathematics
- Egyptian Journal of Mathematics
- Bulletin of the Malaysian Mathematical Sciences Society
- Springer Proceedings in Mathematics and Statistics
- Contemporary Mathematics AMS.
- Meditteranean Journal of Mathematics
- "Matematicheskii Sbornik" journal; Steklov Mathematical Institute of RAS
- Rocky Mountain Journal of Mathematics
- Hacettepe Journal of Mathematics and Statistics.
- Bulletin of the Mexican Mathematical Society.
- Proceedings of the Estonian Academy of Sciences.
- Electronic Reserach Archive
- Proceedings of the Royal Society A.
- Symmetry, Integrability and Geometry: Methods and Applications (SIGMA).
- Communications in Mathematics (EPIsciences).
- Tohuku Mathematical Journal.

*Reviewer*:

- American Mathematical Society Reviewer
- Zentralblatt Math Reviewer

*Service to* NSF:

- NSF panelist 2023

## Teaching Experience

Mathematics courses, including but not limited to the following:

- Graduate: Foliations and 3-manifolds, Quandle Theory with Applications, Combinatorial Homology of Knots and Links, Methods of Applied Topology, Homology Theory, Braid Groups, Hopf Algebras, Homology theories of knots and links, Quantum Invariants of Knots and 3-manifolds, Quantum Groups and Knots, Representation Theory of Groups and Lie algebras, Topology I, Topology II, Graph Theory & Independent Studies.
- Undergraduate: Introduction to Topology, Hyperbolic Geometry, Abstract Algebra, Elementary Number Theory, Linear Algebra, Differential Equations, Business Calculus, Elementary Calculus, Calculus I – III, Engineering Calculus I – III, Vector Calculus, Geometry, College Algebra, College Algebra and Trigonometry, Probability, Statistics & Independent Study.
- Secondary Education: Pre-Algebra, Algebra I & II, and Calculus

## Awards, Certifications & Memberships

- Collaboration Grant for Mathematicians, Simons Foundation, Award Number: 712462, 2020-2025.
- Faculty International Travel Grant, College of Arts and Sciences, University of South Florida, 2019
- Faculty International Travel Grant, College of Arts and Sciences, University of South Florida, 2015
- Faculty International Travel Grant, College of Arts and Sciences, University of South Florida, 2011
- New Researcher Grant, College of Arts and Sciences, University of South Florida, 2008
- Florida Promise, Hillsborough County School District, Dept. of Math. and Stats., and College of Education, 2008–2010
- Project A.C.E., Hillsborough County School District, Dept. of Math. and Stats., and College of Education, 2007
- Faculty Development Grant, College of Arts and Sciences, University of South Florida, 2005
- Faculty Research Mentor Award, University of South Florida, McNair Scholars Program, April 25, 2002
- Award for Outstanding Adjunct Professor, University of South Florida, 1997–1998

- Certificate of Appreciation, presented by The National Society of Professional Engineers for coaching advanced secondary students at the annual MathCounts competition, February 14, 1998
- Member of the American Mathematical Society, 1998–present
- Member of the Mathematical Association of America, 1998–present
- Member of the Moroccan Mathematical Society, 2016–present

## Current and Future Research

Low Dimensional Topology, Quantum and Classical Invariants of Knots, Application of Knot Theory to Biology, Mathematical Physics, Applied Topology, and K-Theory

## Ph.D. Thesis

*Ph.D. Thesis Title "On Lambda-Operations and L-theory"*

In the first part of the thesis, I defined, for all rings $A$ with involution, a $\lambda$-ring structure on the orthogonal $K$-theory of $A$ by using a Witt's theorem of extension of isometries. I proved that the morphism from $L$-theory to $K$-theory induced by forgetful functor is a morphism of $\lambda$-rings. The second part of the thesis is devoted to an analogue of Goodwillie's theorem relating algebraic $K$-theory to cyclic homology. By using a Volodin relative model in $L$-theory and the relationship given by Malcev theory between nilpotent Lie algebra over $\mathbb{Q}$ and uniquely divisible groups, I proved that, rationally, relative $L$-theory is the same as relative Dihedral homology. In the third part, I have shown that there is no crossed simplicial group with geometric realization the Lie group $S^3$. I have constructed a long exact sequence connecting $S^3$-equivariant homology of an $S^3$-space with its Pin(2)-equivariant homology. I have deduced the obstruction to the equality of the two homologies. I also interpreted the periodicity exact sequence in quaternionic homology as a Gysin exact sequence of an $S^3$-fibration.

## Editorial

- Open Mathematics - De Gruyter

## Publications

### Book(s)

1. *"Quandles: An Introduction to the Algebra of Knots,"* with S. Nelson, Student Mathematical Library, 74. American Mathematical Society, Providence, RI, 2015, 245 pp., ISBN-13: 978-1-4704-2213-4.
   `http://bookstore.ams.org/stml-74`.

### Research Articles

2. *Knot groups, quandle extensions and orderability,* with Idrissa Ba, arXiv:2307.08605, 2023, submitted for publication.

3. *On the representation theory of dihedral and cyclic quandles*, with Prasad Senesi and Emanuele Zappala, arXiv:2307.03728, 2023, submitted for publication.

4. *Alexander Polynomial and Circuit Topology*, with J. Ceniceros and A. Mashaghi, submitted for publication.

5. *A G-Family of Singquandles and Invariants of Dichromatic Singular links,* with Danish Ali and Ibrahim Mohd Sheikh, arXiv:2301.03792, submitted for publication.

6. *On Ternary $F$-manifold Algebras and their Representations*, with A. Ben Hassine, T. Chtioui and S. Mabrouk, arXiv:4668466, submitted for publication.

7. *Deformations of Yang-Baxter Operators via n-Lie Algebra Cohomology,* with Emanuele Zappala, arXiv:2207.13156, submitted for publication.

8. *Decomposition of the Regular Representation for Dihedral Quandles*, with Prasad Senesi and Emanuele Zappala, arXiv:2206.06311, 2022.

9. *On Schur Algebras and Derivations of Free Lie Algebras,* with Fred Cohen, Tao Jin and Minghui Liu, arXiv:2206.03548, 2022, submitted for publication.

10. *Circular Orderability and Quandles* with Idrissa Ba, arXiv:2204.09458, submitted for publication.

11. *Cohomology and Deformations of left-symmetric Rinehart Algebras*, with A. Ben Hassine, T. Chtioui and S. Mabrouk, arXiv:2010.00335, submitted for publication.

12. *Classification of Connected Shelves,* with Neranga Fernando and Mathew Goonewardena, to appear in New Zealand J. Math. 2023.

13. *RNA foldings and Stuck Knots,* with J. Ceniceros, J. Kossimar and H. Lahrani, to appear in Commun. Korean Math. Soc. 2023.

14. *Enhancements of link colorings via idempotents of quandle rings,* with B. Nunez and M. Singh, Journal of Pure and Applied Algebra 227 (2023) 107400.

15. *Idempotents, free products and quandle coverings,* with B. Nunez, M. Singh and D. Swain, International Journal of Mathematics, Vol. 34, No. 03, 2350011 (2023). arXiv:2204.11288.

16. *RNA foldings, Oriented Stuck Knots and State Sum Invariants,* with J. Ceniceros, B. Magill, G. Rosario, Journal of Mathematical Physics, Vol.64, Issue 3. https://doi.org/10.1063/5.014065

17. *Topologies, Posets and Finite Quandles,* with Tushar Gona and Hitakshi Lahrani, Extracta Mathematicae Vol. 38, Num. 1 (2023), 1 – 15.

18. *Q-Series and Quantum Spin Networks*, with J. Levitt and M. Hajij, J. Topol. Anal. Vol. 14, No. 03, pp. 709-727 (2022).

19. *Singular Quandles and Shadow Colorings*, with J. Ceniceros and Indu R. U. Churchill, Canad. Math. Bull. Vol. 65 (3), 2022, pp. 770-787.

20. *The Derivation Problem for Quandle Algebras*, with A. Makhlouf, S. Silvestrov and E. Zappala, International Journal of Algebra and Computation, Vol. 32, No. 5 (2022), 985–1007.

21. *Extensions and crossed modules of n-Lie Rinehart algebras*, with A. Ben Hassine, T. Chtioui and S. Mabrouk, Adv. Appl. Clifford Algebr. 32 (2022), no. 3, Paper No. 31.

22. *Singquandles, Psyquandles and Singular Knots: A Survey*, with J. Ceniceros, Indu R. U. Churchill and M. Hajij, J. Knot Theory Ramifications 30 (2021), no. 12, Paper No. 2141003, 23 pp.

23. *Skein theoretic approach to Yang-Baxter homology*, with M. Saito and E. Zappala, Topology Appl. 302 (2021), 107836.

24. *Cocycle Invariants and Oriented Singular Knots*, with J. Ceniceros, Indu R. U. Churchill and M. Hajij, Mediterr. J. Math. 18 (2021), no. 5, 217.

25. *Legendrian Rack Invariants of Legendrian Knots*, with J. Ceniceros and S. Nelson, Commun. Korean Math. Soc. 36 (2021), no. 3, 623–639.

26. *Enhancement of the Coloring Invariant for folded molecular chains*, with J. Ceniceros and A. Mashaghi, J. Math. Phys. 62 (2021), no. 7, 073501. https://doi.org/10.1063/5.0040051.

27. *Heap and Ternary Self-Distributive Cohomology*, with M. Saito and E. Zappala, Comm. Algebra 49 (2021), no. 6, 2378–2401. https://doi.org/10.1080/00927872.2020.1871484.

28. *Coloring Invariant of Topological Circuits in Folded Linear Chains*, with J. Ceniceros and A. Mashaghi, Symmetry 2021, 13(6), 919; https://doi.org/10.3390/sym13060919.

29. *Higher Arity Self-Distributive Operations in Cascades and their Cohomology*, with M. Saito and E. Zappala, Journal of Algebra and its Applications Vol. 20, No. 07, 2150116 (2021).

30. *Polynomial Invariants of Singular Knots and links*, with J. Ceniceros and Indu R. U. Churchill, J. Knot Theory Ramifications 30 (2021), no. 1, 2150003, 17 pp.

31. *On Fox Colorings of Knots*, with H. Abchir and S. Lamsifer, Grad. J. Math. Volume 5, Issue 2 (2021), 122-137.

32. *Knot Theory for Proteins: Gauss Code, Quandles and Bondles,* with C. Adams, J. Devadoss and A. Mashaghi, Journal of Mathematical Chemistry (2020). https://doi.org/10.1007/s10910-020-01151-0, arXiv:1912.09353.

33. *Framed Knots*, with M. Hajij and K. Istvan, Math. Intelligencer 42 (2020), no. 4, 7–22. https://doi.org/10.1007/s00283-020-09990-0. arXiv:1910.10257.

34. *A survey of Racks and Quandles: Some Recent Developments,* Algebra Colloquium 27 : 3 (2020) pp 509-522, DOI: 10.1142/S1005386720000425.

35. *On the classification of $f$-quandles,* with Rasika Churchill and Nicolas Van Kempen, Springer Proceedings in Mathematics & Statistics book series (PROMS, volume 317), Algebraic Structures and Applications pp 359-369.

36. *Generalized Derivations of $n$-BiHom-Lie algebras* with A. Ben Abdeljelil, I. Kaygodorov and A. Makhlouf, (2018), arXiv:1901.09750, Springer Proceedings in Mathematics & Statistics book series (PROMS, volume 317), Algebraic Structures and Applications pp 81-97.

37. *Continuous Cohomology of Topological Quandles*, with M. Saito and E. Zappala, J. Knot Theory Ramifications Vol. 28, no. 6 (2019) 1950036 (22 pages).

38. *Ring Theoretic Aspects of Quandles*, with N. Fernando and B. Tsvelikhovskiy, Journal of Algebra 526 (2019) pp166-187.

39. *On the Classification of Topological Quandles*, with Z. Cheng and B. Shekhtman, Topology and its Applications 248 (2018) 64-74.

40. *Generating sets of Reidemeister moves of oriented singular links and quandles*, with K. Bataineh, M. Hajij and Will Youmans, J. Knot Theory Ramifications 27 (2018), no. 14, 1850064, 15 pp.

41. *Foundations of the colored Jones polynomial of singular knots*, with M. Hajij, Bull. Korean Math. Soc. 2018, Vol. 55, No. 3, 937-956.

42. *On Rational Knots and Links on the Solid Torus*, with K. Bataineh and M. Hajij, Mediterranean J. Math. 15 (2018), no. 4, 15:171.

43. *Quasi-trivial Quandles and Biquandles, Cocycle Enhancements and Link-Homotopy of Pretzel Links*, with M. Liu and S. Nelson, J. Knot Theory Ramifications, Vol. 27, No. 11 (2018) 1843007 (16 pages).

44. *Finitely Stable Racks and Rack Representation*, with E. Moutuou, 2018, Communications in Algebra, vol. 46, no. 11, 4787-4802, 2018.

45. *Singular Knots and Involutive Quandles*, with Indu R. U. Churchill, M. Hajij and S. Nelson, J. Knot Theory Ramifications 27 (2018), no. 14, 1892001, 4 pp.

46. *Ternary and $n$-ary $f$-distributive Structures*, with Indu R. U. Churchill, M. Green and N. Makhlouf, Open Math. 16 (2018), 32-45.

47. *The Cocycle Structure of the Alexander $f$-Quandles on Finite Fields*, with Indu R. U. Churchill and Neranga Fernando, J. Algebra Appl. Vol. 17, No. 10 (2018) 1850190 (20 pages).

48. *Twist Regions and Coefficients Stability of the Colored Jones Polynomial*, with M. Hajij and M. Saito, Trans. Amer. Math. Soc. 370 (2018), no. 7, 5155-5177.

49. *Singular Knots and Involutive Quandles*, with Indu R. U. Churchill, M. Hajij and S. Nelson,J. Knot Theory Ramifications 26 (2017), no. 14, 1750099, 14 pp. https://doi.org/10.1142/S0218216517500997

50. *$f$-Racks, $f$-Quandles, their Extensions and Cohomology*, with Indu R. U. Churchill, M. Green and N. Makhlouf, J. Algebra Appl. Vol. 16, No. 11 (2017) 1750215 (16 pages).

51. *Pretzel Knots and q-Series*, with M. Hajij, Osaka J. Math. Vol. **54**, No. 2, (2017), pp 363-381.

52. *Linear Alexander Quandle Colorings and the Minimum Number of Colors*, with J. Kerr, "Knots, Links, Spatial Graphs, and Algebraic Invariants", Contemp. Math., Amer. Math. Soc. Vol 689, pp 7-22, 2017.

53. *Derivations of Ternary Lie algebras and Generalizations*, with A. Benabdeljalil and N. Makhlouf, Int. Electron. J. Algebra, volume 21 (2017) pp 55-75.http://www.ieja.net/files/papers/volume-21/4-V21-2017.pdf

54. *Fox coloring and the minimum number of colors*, with J. Kerr, Involve A Journal of Mathematics, Vol 10, no 2, pp. 291-316. (2017). http://msp.org/involve/2017/10-2/p07.xhtml

55. *The colored Jones polynomial of singular knots*, with K. Bataineh and M. Hajij, New York J. Math. 22 (2016) 1439–1456. http://nyjm.albany.edu/j/2016/22-62p.pdf

56. *Foundations of Topological Racks and Quandles*, with E. Moutuou, J. Knot Theory Ramifications Vol. 25, No. 03, (2016) 1640002 (17 pages). http://www.worldscientific.com/doi/abs/10.1142/S0218216516400022

57. *Ternary Distributive Algebraic Structures*, with M. Green and N. Makhlouf, Kyungpook Math. J. Vol. 56, No. 1, (2016), pp 1-27. http://pdf.medrang.co.kr/kmj/56/kmj056-01-01.pdf

58. *Augmented Biracks and their Homology* , with J. Ceniceros, M. Green and S. Nelson, Internat. J. Math. vol. 25, no. 9 (2014) 1450087 (19 pages). http://www.worldscientific.com/doi/abs/10.1142/S0129167X14500876

59. *Quandles colorings of Knots and Applications*, with W. E. Clark, M. Saito and T. Yeatman, J. Knot Theory Ramifications vol. 23, no.6 (2014) 1450035 (29 pages). http://www.worldscientific.com/doi/abs/10.1142/S0218216514500357

60. *Distributivity in quandles and quasigroups*, Algebra, geometry and mathematical physics, 325-340, Springer Proc. Math. Stat., 85, Springer, Heidelberg, 2014. http://link.springer.com/chapter/10.1007/978-3-642-55361-5_19

61. *Connected quandles associated with pointed abelian groups*, with W. E. Clark, X. Hou, M. Saito and T. Yeatman, Pacific J. Math. 264 (2013), no. 1, 31-60. http://msp.org/pjm/2013/264-1/p02.xhtml

62. *Hom-quasi-bialgebras*, with A. Makhlouf, Hopf algebras and tensor categories, 227-245, Contemp. Math., 585, Amer. Math. Soc., Providence, RI, 2013. http://www.ams.org/mathscinet/search/series.html?cn=Contemp_Math

63. *N-degeneracy in rack homology and link invariants*, with S. Nelson, Hiroshima Math. J. **42** (2012), no. 1, pp. 127–142, http://projecteuclid.org/getRecord?id=euclid.hmj/1333113010.

64. *Automorphism groups of quandles*, with J. MacQuarrie and R. Restrepo, J. Algebra Appl. **11** (2012), no. 1, pp. 1250008, 9, http://dx.doi.org/10.1142/S0219498812500089.

65. *Deformations of Hom-alternative and Hom–Malcev algebras*, with A. Makhlouf, Algebras Groups Geom. **28** (2011), no. 2, pp. 117–145. http://www.hadronicpress.com/AGGVOL/ISSIndex.php?VOL=28&Issue=2

66. *Cohomology and formal deformations of alternative algebras*, with A. Makhlouf, J. Gen. Lie Theory Appl. **5** (2011), Art. ID G110105, 10, http://dx.doi.org/10.4303/jglta/G110105.

67. *Hermitian algebraic K-theory and dihedral homology*, Int. J. Algebra **4** (2010), nos. 1–4, pp. 143–152. http://www.m-hikari.com/ija/ija-2010/ija-1-4-2010/elhamdadiIJA1-4-2010.pdf

68. *Virtual knot invariants from group biquandles and their cocycles*, with J. S. Carter, D. S. Silver, S. G. Williams and M. Saito, J. Knot Theory Ramifications **18** (2009), no. 7, pp. 957–972, http://dx.doi.org/10.1142/S0218216509007269.

69. *Tangle embeddings and quandle cocycle invariants*, with K. Ameur, T. Rose, M. Saito and C. Smudde, Experiment. Math. **17** (2008), no. 4, pp. 487–497, http://projecteuclid.org/getRecord?id=euclid.em/1243429961.

70. *Cohomology of Frobenius algebras and the Yang–Baxter equation*, with J. S. Carter, A. S. Crans, E. Karadayi and M. Saito, Commun. Contemp. Math. **10** (2008), suppl. 1, pp. 791–814, http://dx.doi.org/10.1142/S0219199708003022.

71. *Cohomology of categorical self-distributivity*, with J. S. Carter, A. S. Crans and M. Saito, J. Homotopy Relat. Struct. **3** (2008), no. 1, pp. 13–63. http://tcms.org.ge/Journals/JHRS/xvolumes/2008/n1a2/v3n1a2hl.pdf

72. *Cohomology of the adjoint of Hopf algebras*, with J. S. Carter, A. S. Crans and M. Saito, J. Gen. Lie Theory Appl. **2** (2008), no. 1, pp. 19–34, http://dx.doi.org/10.4303/jglta/S070102.

73. *A lower bound for the number of Reidemeister moves of type III*, with J. S. Carter, M. Saito and S. Satoh, Topology Appl. **153** (2006), no. 15, pp. 2788–2794, http://dx.doi.org/10.1016/j.topol.2005.11.011.

74. *Cocycle knot invariants from quandle modules and generalized quandle homology*, with J. S. Carter, M. Graña and M. Saito, Osaka J. Math. **42** (2005), no. 3, pp. 499–541, http://projecteuclid.org/getRecord?id=euclid.ojm/1153494500.

75. *Homology theory for the set-theoretic Yang–Baxter equation and knot invariants from generalizations of quandles*, with J. S. Carter and M. Saito, Fund. Math. **184** (2004), pp. 31–54, http://dx.doi.org/10.4064/fm184-0-3.

76. *On the Steenrod operations in cyclic cohomology*, with Y. G. Gouda, Int. J. Math. Math. Sci. (2003), no. 72, pp. 4539–4545, http://dx.doi.org/10.1155/S016117120320908X.

77. *Extensions of quandles and cocycle knot invariants*, with J. S. Carter, M. Appiou Nikiforou and M. Saito, J. Knot Theory Ramifications **12** (2003), no. 6, pp. 725–738, http://dx.doi.org/10.1142/S0218216503002718.

78. *Twisted quandle homology theory and cocycle knot invariants*, with J. S. Carter and M. Saito, Algebr. Geom. Topol. **2** (2002), pp. 95–135 (electronic), http://dx.doi.org/10.2140/agt.2002.2.95.

79. *On $S^3$-equivariant homology*, Int. J. Math. Math. Sci. **26** (2001), no. 4, pp. 193–197, http://dx.doi.org/10.1155/S0161171201005804.

80. *A note on $\lambda$-operations in orthogonal $K$-theory*, Proc. Amer. Math. Soc. **128** (2000), no. 1, pp. 1–4, http://dx.doi.org/10.1090/S0002-9939-99-05376-9.

81. *Sur les $\lambda$-opérations et la $L$-théorie*, Thèse de Doctorat de l'université de Nice-Sophia Antipolis, 1996.

## Supervision of PostDocs and Students

- Manpreet Singh (PostDoc funded by Fullbright, 2023-present).
- Mustafa Hajij (PostDoc, 2015-2017).
- Elkaïoum Moutuou (PostDoc, 2016-2017).
- Dipali Swain *(Current Ph.D. Student, 2021-present).*
- Brooke Jones *(Current Ph.D. Student, 2022-present).*

- Hitakshi Lahrani, *Ph.D. Thesis,* Title: *Classification of Finite Topological Quandles and Shelves via Posets*, Hitakshi defended her thesis on Friday, June 16, 2023.
- Emanuele Zappala, *Ph.D. Thesis,* Title: *Non-Associative Algebraic Structures in Knot Theory.* Emanuele defended his thesis on Friday November 1, 2019.
- Amine Ben Abdeljelil, *Ph.D. Thesis,* Title: *Generalized Derivations of Ternary Lie Algebras and n-BiHom-Lie Algebras.* Amine defended his thesis on Friday May 24, 2019.
- Matthew Green, *Ph.D. Thesis,* Title: *Generalizations of Quandles and their Cohomologies.* Matt defended his thesis on Thursday June 21, 2018.
- Indu Rasika Churchill, *Ph.D. Thesis,* Title: *Contributions to Quandle Theory: A Study of $f$-Quandles, Extensions and Cohomology,* (defended on May 3, 2017), currently, Assistant Professor at SUNY.
- Jeremy Kerr, *Masters Thesis,* Title: On the Number of Colors in Quandle Knot Colorings, 2016.
- Jennifer MacQuarrie, *Masters Thesis,* Title: Automorphism Groups of Quandles, 2011.
- Grant Conine, *Honors Thesis,* Title: Braid Group Cryptography, 2011.
- Justin Doromal, *Honors Thesis,* Title: Knot Theory via Quandle Structures, 2011.

**Visiting Professorships and Research**

- Department of Mathematics/ Applied Mathematics, Mälardalen University, Sweden, November 2018.
- Laboratoire de Mathématiques, Informatique et Applications, Université des Haute Alsace, France, November & December 2018.
- Departement de Mathématiques, Université d'Evry Val-d'Essonne, Paris-Saclay, November & December 2017.
- School of Mathematical Siences, Beijing Normal University, November 2017.
- Laboratoire de Mathématiques, Informatique et Applications, Université des Haute Alsace, France, June 2009
- Instituto Nacional de Matematica Pura e Aplicada (IMPA), Rio de Janeiro, Brazil, June 2008.
- International Centre for Theoretical Physics (ICTP), Trieste, Italy, June 2007.

**Selected Invited Lectures**

- "Circular Orderings on Quandles" Knots in Washington XLIX.9375, George Washington University, April 28-30, 2023.
- "A gentle introduction to Quandle Theory" Zoom Seminar at the Department of Mathematics and Computer Science, College of the Holy Cross, April 04, 2023.
- "Invariants of links from quandle rings" Knots, Algebra and Geometry, Online conference on the occasion of 60th birthdays of Valeriy Bardakov and Andrei Vesnin, March 18, 2023.
- "Knot invariants from idempotents in quandle rings" 2023 Spring Central Sectional Meeting University of Cincinnati, OH, April 15-16, 2023, Meeting #1186.
- "A Bridge between low dimensional topology and Algebra via Quandles". Algebra Seminar, Ohio University, October 27 and November 3, 2022.
- "Algebraic K-Theory and Connections to Topology".CIMPA Research School, Algebraic Methods in Topology, El Salvador, July 19-22, 2022.
- "Circular Orderability of Quandles" International conference Knot Theory and Applications, Satellite Conference to the ICM, June 29-July 05, 2022, Tomsk, Russia.
- "On Quandles and Quandle rings," Seminars on knot theory and related topics, June 27, 2022, Moscow.
- "An Introduction to Quandle Algebras".Classical and Constructive Nonassociative Algebraic Structures: Foundations and Applications-CaCNAS:FA2021" Zoominar Serbia, June 30-July 02, 2021.
- "Quandles: non-associative algebraic structures from knot theory" African Mathematics Seminar, Zoominar talk June 16, 2021.
- "An introduction to quandle algebras" Seminar talk, University Cadi-Ayyad, Marakech, Morocco, Nov 28, 2020.
- "A survey of quandle theory." Knots Through Web (Online), International Centre for Theoretical Sciences of Tata Institute of Fundamental Research, Bangalore India, August 24 and 25, 2020.
- "Connes's periodicity for Quaternionic homology", Topology and Dynamics Seminar, University of Florida, Sept 10, 2019.
- "Legendrian Rack Invariants of Legendrian Knots." AMS meeting #1147, University of Hawaii, Honolulu, March 22-24, 2019.
- "Ring Theoretic Aspects of Quandles" Knots in Washington XLVII, George Washington University, January 20-21, 2019.

- "From Topological to Lie Quandles" Fourth Euro-Maghreb Conference in Algebra, Geometry and Lie Theory, Hammamet, Tunisia, 17 December 2018.
- "Sur les anneaux de Quandles" Seminar (in French), Laboratoire de Mathématiques, Informatique et Applications, Université des Haute Alsace, France, December 6, 2018.
- "An Algebraic Approach to the Theory of Quandles" MAM workshop on Algebraic Structures Västerås, Mälardalen University, November 29, 2018, Sweden.
- "Quandles and algebra of Knots," Intensive MAM research frontier lectures, PhD course, Västerås Mälardalen University, November 27, 2018, Sweden.
- "An Algebraic Approach to Quandles" International Conference on Algebra and Related Topics, ICART 2018, July 2-5, Rabat, Morocco.
- "Quandles and Groups" 2018 Zassenhaus Groups and Friends Conference at University of South Florida, April 6-8, 2018.
- "Singular Knots and Quandles," AMS meeting #1136, Algebraic, Combinatorial, and Quantum Invariants of Knots and Manifolds, Ohio State University, Columbus, OH, March 16-18, 2018.
- "From Finite to Topological Quandles: A Survey" Colloquium talk at Beijing Normal University, China, November 24, 2017.
- "Introduction to the Colored Jones polynomial": Seminar talk at Université d'Evry Val-d'Essonne, Paris-Saclay, December 12, 2017.
- "Representation theory for racks" Knots in Washington XLIV, George Washington University, April 28-30, 2017.
- "Classification of Topological Quandles on the reals" Knots in Washington XLIII, George Washington University, 60th birthday of S. Carter, December9-11, 2016.
- "Recent Developments in the Theory of Quandles", Moroccan Mathematical Society Colloquium, University Ibn Tofail, Kenitra, Morocco, September 22-24, 2016.
- "A Survey of Quandles with some recent developments" Quantum Algebras, Quantum Integrable Models and Quantum Information. Satellite Event to the 7th European Congress of Mathematics. Kristineberg, Sweden, July 11-15, 2016.
- "A one variable Generalization of the Kauffman-Vogel Polynomial" AMS meeting #1117, University of Georgia, Athens, GA March 4-5, 2016.
- "From Quandle Modules to Sheaves on Topological Quandles," seminar lecture, University of South Florida, February 8, 2016.

- "Sheaves on topological quandles" AMS meeting #1114, California State University, Fullerton, CA October 24-25, 2015. Event: Algebraic and Combinatorial Structures in Knot Theory.
- "Continuous Cohomology of Topological Quandles" AMS meeting #1110, University of Nevada, Las Vegas, NV April 18-19, 2015. Event: Algebraic Structures in Knot Theory, III
- "Foundations of Topological Quandles" . Conference on Knot Theory and Its Applications to Physics and Quantum Computing; 60th birthday of Jozef H. Przytycki, University of Texas at Dallas, January 6-9, 2015.
- "Ternary Distributive Algebraic Structures" AMS Meeting #1095, University of California, Riverside, Riverside, CA. November 2-3, 2013.
- "Cohomology of Groups and Crystallography," seminar lecture, University of South Florida, October 2013
- "Galkin Quandles and Colorings of Knots Knots in Washington XXIII, George Washington University, December 2011.
- "Invariants of Knots from Quandle Cohomology," colloquium talk, Harvey Mudd College, CA, April 2010
- "On the Cohomology of a Non-Associative Algebraic Structure with Applications to Knot Theory," (in French) Seminar Lecture, Université des Haute Alsace, France, April 2009
- "Khovanov homology of Knots," seminar lecture, University of South Florida, November 2008
- "From the Jones polynomial to Khovanov homology," seminar lecture, University of South Florida, November 2008
- "Self-distributive groupoids from an algebraic point of view," 5th Internal Conference, Fez, Morocco, June 2008
- "Generalized Quandle homology and cocycle knot invariants," AMS-SBM, Rio de Janeiro, Brazil, June 2008
- "Generalized Quandle homology and Applications," AMS Meeting #1037, Baton Rouge, LA, March 2008
- "Self-distributivity, cohomology and knot inv.," Geometry, Topology and Dynamical Sy. Marrakech Univ., May 28, 2007
- "The adjoint of Hopf algebras and cohomology," Knots in Washington XXIII, George Washington Univ., November 18, 2006

- "Biquandles and knot invariants," Knots in Washington XXII, George Washington University, May 5, 2006
- "Quandle cohomology and knot invariants," Topology Seminar, University of Kentucky, April 11, 2006
- "Homological Algebra of Racks and Quandles II," Algebra Seminar, University of South Alabama, March 11, 2005
- "Homological Algebra of Racks and Quandles I," Topology Seminar, University of South Alabama, March 8, 2005
- "Quandle Modules and Cocycle knot Invariants," Port City Conf., Univ. of South Alabama, February 2005
- "Biquandles and Cocycle knot Invariants," Seminar Lecture, University of South Alabama, March 2004
- "On Knot Invariants," Colloquium Lecture at Marshall University, Huntington, WV, February 2004
- "A spectral sequence in quandle homology," AMS Meeting #982 (Session: Invariants of Knots and Low-Dimensional Topology), Orlando, Florida, November 2002
- "A generalization of Quandles and Homology theory of set-theoretic Yang-Baxter equations," AMS Meeting #978 (Session: Quantum Topology), Portland, Oregon, June 2002
- "Part IV: Cyclic homology of Algebras," seminar lecture, University of South Florida, March 2001
- "Part III: Cyclic homology of Algebras," seminar lecture, University of South Florida, March 2001
- "Part II: Cyclic homology of Algebras," seminar lecture, University of South Florida, February 2001
- "Part I: Cyclic homology of Algebras," seminar lecture, University of South Florida, February 2001
- "An approach to quaternionic homology," International Centre for Theoretical Physics, Trieste, Italy, April 1999
- "Part I: Introduction to Algebraic K-theory," seminar lecture, University of South Florida, February 1998
- "Part II: Introduction to Algebraic K-theory," seminar lecture, University of South Florida, February 1998

- "$S^3$-equivariant homology and quaternionic homology," seminar lecture, Purdue University at W. Lafayette, December 1996
- "Homology Stability of Orthogonal Groups," seminar lecture, University of Nice-Sophia Antipolis, April 1996

**Professional Meetings Attended**

- "Knots in Washington XLVII", George Washington University, January 20-21, 2019.
- "Joint Mathematics Meeting", Balltimore,January 16-19, 2019.
- "Fourth Euro-Maghreb Conference in Algebra, Geometry and Lie Theory", Hammamet, Tunisia, 17 December 2018.
- "MAM workshop on Algebraic Structures" V*ä*ster*å*s, M*ä*lardalen University, November 29, 2018, Sweden.
- " Intensive MAM research frontier lectures", PhD course, V*ä*ster*å*s M*ä*lardalen University, November 27, 2018, Sweden.
- "International Conference on Algebra and Related Topics", ICART, July 2-5, Rabat, Morocco, 2018.
- "Quandles and Groups" 2018 Zassenhaus Groups and Friends Conference at University of South Florida, April 6-8, 2018.
- "Quandles and Groups" 2018 Zassenhaus Groups and Friends Conference at University of South Florida, April 6-8, 2018.
- "Knots in Washington XLIV", George Washington University, April 28-30, 2017.
- "Knots in Washington XLIII, George Washington University", 60th birthday of S. Carter, December 9-11, 2016.
- Quantum Algebras, Quantum Integrable Models and Quantum Information. Satellite Event to the 7th European Congress of Mathematics. Kristineberg, Sweden, 11-15 July 2016.
- "Algebraic Structures in Knot Theory" AMS meeting #1117, University of Georgia, Athens, GA. March 5-6, 2016.
- "Algebraic and Combinatorial Structures in Knot Theory." American Mathematical Society meeting #1114, California State University, Fullerton, CA October 2015.
- "Algebraic Structures in Knot Theory," American Mathematical Society meeting #1110, University of Nevada, Las Vegas, NV April 2015.

- "Conference on Knot Theory and Its Applications to Physics and Quantum Computing;" 60th birthday of Jozef H. Przytycki, University of Texas at Dallas, January 2015.
- "Algebraic Structures in Knot Theory," American Mathematical Society meeting Meeting #1095, University of California, Riverside, Riverside, CA. November 2013.
- " Knots in Washington XXIII, Categorification of Knots, Algebras, and Quandles; Quantum Computing, George Washington University, December 2011.
- " Algebra Geometry Mathematical Physics VII", University of Haute Alsace, Mulhouse, France, October 2011.
- "Commutative Algebra and Applications," 5th Internal Conference, Fez, Morocco, June 2008
- "Low Dimensional Topology," AMS-SBM, Rio de Janeiro, Brazil, June 2008
- Recent Advances in Knot theory, AMS Meeting #1037, Baton Rouge, LA, May 2008
- Geometry Topology and Dynamical systems, Marrakech University, Morocco, May 2007
- Knots in Washington XXII, George Washington University, Washington, DC, May 2006
- Joint Mathematics Meeting, San Antonio, TX, January 2006
- Quantum Topology, Summer Research Conference, Snowbird, UT, June 2005
- Port City Conference, University of South Alabama, Mobile, AL, February 2005
- Knots in Washington XX, George Washington University, Washington, DC, February 2005
- Joint Mathematics Meeting, Atlanta, GA, January 2005
- Joint Mathematics Meeting, Phoenix, AZ, January 2004
- American Mathematical Society meeting, Orlando, FL, November 2002
- American Mathematical Society meeting, Portland, OR, June 2002
- Clifford Lecture Series conference, Tulane University, New Orleans, LA, December 2000
- Joint Mathematics Meeting, Washington, DC, January 2000
- Conference on "Quadratic forms and their Applications," University College, Dublin, Ireland, July 1999

## Computer Skills

LaTeX, GAP (Group Algorithm and Programming), Maple, Word, WordPerfect, MS-DOS, UNIX.

## Languages

English, Arabic, French, Italian, and Spanish