

Curriculum Vitae for Reza Aghayan, Ph.D.

Reza Aghayan received his joint PhD in Mathematics and Computer Science from Kingston University London in 2013. He was on the faculty of the School of Mathematics at Azad University since 2002 and served the school as an assistant professor between 2013 and 2015. Dr. Aghayan joined the Department of Mathematics at UTSA as a fulltime faculty, since Spring 2016. His recent research interests revolve around ‘Signature theory and its applications in Image Analysis’. He has done research on differential geometry, Cartan’s equivalence method, classical invariant theory, geometric numerical methods, and computer vision. His research was received continuous AZAD funding from 2006 to 2015. Dr. Aghayan is the author of 18 papers. He also authored “Ordinary Differential Equations” over 690 pages in 2007 which its 20th edition was published recently.

Contact Information

- **Faculty member:** Reza Aghayan – Associate Professor of Instruction.
- **UTSA address:** Department of Mathematics – One UTSA circle, San Antonio, TX 78249.
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Educational Background

- **Post graduate education**

PhD in Mathematics and Computer science: Kingston University London-Faculty of SEC, London, UK – 2013.

➤ Title of the PhD Thesis: “K-point Group-signatures in Curve Analysis”.

MSc in Pure Mathematics: Institute for Advanced Studies in Basic Sciences-Department of Mathematics – Zanjan, IRAN – 2001.

➤ Title of Master Thesis: “Symplectic Geometry and Foundations of Mechanics”.

- **Undergraduate education**

BSc in Pure Mathematics: Sharif University of Technology-Department of Mathematical Sciences – Tehran, IRAN – 1998.

➤ Title of Bachelor Project: “Symplectic Manifolds”.

Professional Employment History (full-time positions)

- **Associate Professor of Instruction:** September 2021-Present – UTSA-Department of Mathematics.
- **Lecturer III:** September 2018-Present – UTSA-Department of Mathematics.
- **Lecturer II:** January 2016-September 2018 – UTSA-Department of Mathematics.
- **Assistant Professor** (tenured position): Azad University-Eslamshahr Branch – Tehran, IRAN – December 2013-August 2015.
- **Faculty Instructor** (tenured position): Azad University-Eslamshahr Branch – Tehran, IRAN – February 2002-December 2013.

Awards and Honors

- **Honored and Recognized:** At the Faculty and Staff Appreciation Day – November 2019.
- **Received the Amber Award:** Honored and recognized in the 20th Annual Amber Dinner for the dedication and passion for teaching – February 9, 2018.
- **Travel Award:** \$700 funded by the Department of Mathematics-UTSA for 2018 SIAM Annual Meeting, Portland, Oregon, USA – My paper was accepted for an oral presentation.
- **Travel Award:** \$4,691 funded by AZAD University for a Research Opportunity at the University of Minnesota – 2012.
- **Faculty Completion Bursary:** 6000 GBP funded by Kingston University London – 2013.
- **Azad Doctoral Scholarships:** Azad University – 2008.

P.S. I received more Travel Awards from the previous universities in which I worked or studied. For example, two and each about \$900, from Azad University, to present my papers in two international conferences or a couple from Kingston University.

Research/Scholarly/Creative Activities

• Journal articles

➤ Computer Vision and Image Analysis:

Reza Aghayan, “Generating Visual Invariants –a new approach to Invariant Recognition”, Theory of Computing Systems, vol. 66(1), pp. 1-37, July 2021,

Reza Aghayan, “Numerical Joint Invariant Level Set Formulation-with Unique Image Segmentation Result”, Machine Vision and Applications, vol. 32, issue 1, pp. 1-18, January 2021.

Reza Aghayan, J. Dehmeshki and T. Ellis, “Planar Numerical Signature Theory Applied to Object Recognition”, Journal of Mathematical Imaging and Vision, vol. 48, issue 3, pp. 583-605, 2014.

Reza Aghayan, “Orientation-invariant Numerically Invariant Joint Signatures in Curve Analysis”, International Journal of Computer Mathematics, vol 3, issue 1, pp. 13-30, 2018.

➤ Differential Geometry and the Theory of Lie Groups:

Reza Aghayan, “More about Classical Visual Groups”, Advanced Mathematical Models & Applications, vol.6, no.3, 2021, pp.238-251 2021.

M. Nadjafikhah and **Reza Aghayan**, “Geometry of Distributions and F-Gordon equation”, Mathematical Sciences, 6:49, 2012.

Reza Aghayan, “I. GM-sets Applied to Lie Theory”, Afrika Matematika, vol. 28, issue 5-6, pp. 929-943, 2017.

Reza Aghayan, “II. GM-manifolds and Unique Structure”, Afrika Matematika, vol. 26, issue 1-2, pp. 225-237, 2015.

Reza Aghayan, “G-sets and Applications in Lie theory”, ‘The Online Journal on Mathematics and Statistics’, vol. 2, no. 2, pp. 26-29, 2011.

• Conference articles

Reza Aghayan, “Visual groups and Structural Equations”, in: Proceedings of the 49th Annual Iranian Mathematics Conference-Geometry Section, Tehran, IRAN, August 23-26, 2018, pp. 21-33.

Reza Aghayan, “Signature-inverse Theorem in Mesh Group-planes-The New Formulation”, in: Proceedings of the 49th Annual Iranian Mathematics Conference-Computer Science Section, Tehran, IRAN, August 23-26, 2018, pp. 2310-2327.

Reza Aghayan, “Biases in Numerically Invariant Joint Signatures”, in: Proceedings of the ICACM 2015: International Conference on Applied and Computational Mathematics, October 8-9, 2015, Chicago, USA.

Reza Aghayan, “Detailed Observation in Numerically Invariant Signatures”, in: Proceedings of the ICCSM 2014, 16th International Conference on Computer Science and Mathematics, September 29-30, 2014, Los Angeles, USA.

Reza Aghayan, T. Ellis and J. Dehmeshki, “Joint Invariants in Signature Theory Applied to Object Recognition”, in Proceedings of the IPCV'12, 16th Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, July 16-19, 2012, Las Vegas, USA.

Reza Aghayan, J. Dehmeshki and T. Ellis, “G-conjugacy in Lie Groups Theory”, in: The 5th Annual International Conference on Mathematics, Statistics & Mathematical Education, June 13-16, 2011, Athens, GREECE.

Reza Aghayan and Mehdi Nadjafikhah, “Exterior Differential Systems”, in: Proceedings of the 4th Biannual Conference on Geometry and Topology, Oromia, IRAN, 2007.

Reza Aghayan and Mehdi Nadjafikhah, “Exterior Differential Systems with Symmetry”, in: Proceedings of the 38th Annual Iranian Mathematics Conference, Zanjan, IRAN, 2007.

- **All above-mentioned articles were peer-reviewed and refereed.**

- **Another: Reza Aghayan**, “Signature-inverse Theorem in Mesh Group-planes”, arXiv:2006.03759, 2020,

- **In preparation: Reza Aghayan**, “Numerically Joint Invariant Recognition Applied to Image Analysis”.

• Book

Reza Aghayan, “Ordinary Differential Equations; Lessons and Exam Questions for Undergraduate and Graduate Students”, Modarresan Sharif Press, 690+xi pages, 2007 (20th Edition 2020 – in Farsi).

- **Research projects**

Reza Aghayan, “Signature and Signature-inverse theorems in Mesh Group-planes”, Funded by Azad University, Tehran, IRAN – 2014.

Reza Aghayan, “Orientation-invariant Joint signatures”, Funded by Azad University, Tehran, IRAN – 2014.

Reza Aghayan, “Modeling, Reconstruction and Identification of Objects within Human Body”, Funded by Azad University, Tehran, IRAN – 2012.

Reza Aghayan, “Exterior Differential Systems and its Applications in Computer Vision”, Funded by Azad University, Tehran, IRAN – 2012.

Reza Aghayan and Mehdi Nadjafikhah, “Exterior Differential Systems with Symmetry”, Funded by Azad University, Tehran, IRAN – 2007.

Reza Aghayan and Mehdi Nadjafikhah, “Elie Cartan’s theory and its Applications in Differential Equations”, Funded by Azad University, Tehran, IRAN – 2006.

- **All were peer-reviewed and refereed.**

- **Talks**

“More About Visual Geometries-Visual Structural Equations”, in: 2018 SIAM Annual Meeting, Portland, Oregon, USA, July 9-13, 2018.

“Smooth manifolds and Observables”, at: Department of Mathematics-Iran University of Science and Technology, Tehran, IRAN, 2008. (Weekly Talk through Fall semester)

“Unique structure on G-equivariant manifolds and Applications”, at: Department of Mathematics-Iran University of Science and Technology, Tehran, IRAN, 2010.

“The Theory of k-point G-Signatures and Applications”, at: Department of Basic Sciences-Azad University Eslamshahr Branch, Tehran, IRAN, 2015. (Three Talks)

- **Other activities**

I spent about 6 months –from February 12, 2012 to August 08, 2012 –at the University of Minnesota as a Visiting Scholar and worked closely under the supervision of Professor Peter J. Olver at School of Mathematics.

I spent the period from August 06, 2010 to October 25, 2010 at Iran University of Science and Technology as a Visiting Scholar and worked closely under the supervision of Professor Mehdi Nadjafikhah at Department of Mathematics.

I attended to XI Edition of the Italian Summer School (Diffiety School), Santo Stefano del Sole, Avellino, ITALY, from July 17 to August 1, 2008. I got two diplomas for “Geometry of Finite Order Jet Spaces” and “Observability in Physics and Differential Calculus over Commutative Algebras” managed and taught by Professor Alexandre M. Vinogradov.

I studied Cartan’s equivalence method and its applications in ODE/PDE in DGDE (research group) under the supervision of Professor M. Nadjafikhah at Iran University of Science and Technology, Tehran, IRAN – 2005-2010.

I acted as an External Examiner for three M.Sc. theses in Mathematics, 2014-15.

I acted as an External Examiner for five M.Sc. theses in Computer Science, 2014-15.

Teaching Activities

- **During the past three years**

Spring 2022: Calculus 2 (1 section) and Calculus 1 (2 sections) (undergraduate level).

Fall 2021: Calculus 1 (3 sections) and Algebra for Scientists-Engineers (1 section) (undergraduate level).

Summer 2021: Calculus for Business (2 sections) (undergraduate level).

Spring 2021: Calculus 2 (1 section) and Calculus 1 (2 sections) (undergraduate level).

Fall 2020: Calculus2 (3 sections) and Precalculus (1 section) (undergraduate level).

Summer 2020: Calculus 1 (2 sections) (undergraduate level).

Spring 2020: Calculus 2 (3 sections) and Calculus 1 (1 section) (undergraduate level).

Fall 2019: Calculus 1 (3 sections) and Calculus for Biosciences (2 sections) (undergraduate level).

Summer 2019: Linear Algebra (1 section) and Precalculus (1 section) (undergraduate level).

- **Teaching experience**

UTSA: Linear Algebra, Calculus 2, Calculus 1, Calculus for Business, Calculus for Biosciences, Precalculus, Algebra with Calculus for Business, Algebra for Scientists-Engineers – Texas, USA – 2016-Present.

SAC: Calculus 2, Calculus 1, Calculus for Business, Liberal Arts Math I, Precalculus, Algebra with Calculus for Business, College Algebra (Precal Track), College Algebra, Intermediate Algebra, Pre-Algebra, DE Math for College Algebra, Co-Req for Liberal Arts Math I – Texas, USA – 2015-Present.

Azad University: Research Methodology (for graduate students), Foundations of Mathematics, Foundations of Geometry, Math Analysis, Ordinary Differential Equations, Algebra, Linear Algebra, General Mathematics I, II, and III, Probability and Statistics for Engineers, Precalculus – Tehran, IRAN – 2001-2015.

Kingston University London: Conducting tutoring sessions to help graduate and undergraduate students understand how to deal with their problems and do their homework, as follows.

- Graduate students with Digital Image Processing and Digital Signal Processing,
- Undergraduate students with Fundamental Programming Concepts, HTML Programming & Internet Tools, Computer Graphics & Digital Imaging, Operating Systems & Networking, Engineering & Technology Maths, Introduction to Math Analysis, Introduction to Linear Algebra, and Introduction to Probability & Statistics – London, UK – 2010-2013.

Institute for Advanced Studies in Basic Sciences: Teaching assistant in graduate courses such as Advanced Algebra and Real Analysis – Zanjan, IRAN – 1999.

Service and Professional Activities

- **FTT Promotion Review Committee**: Department of Mathematics-UTSA – January 2022-Present.
- **Academic Program Review Committee**: Department of Mathematics-UTSA – October 2020-Present.
- **Annual Review Committee**: Department of Mathematics-UTSA – January 2020-Present.
- **Core Curriculum Committee**: Department of Mathematics-UTSA – September 2018-September 2019.
- **Course Coordination Committees**: Department of Mathematics-UTSA – September 2019-Present (for different courses).
- **Served as a Judge**: At the COS Student Research Conference-UTSA – October 2017.
- **Writing Letters of Recommendations.**
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Professionally,
Reza Aghayan