



## Professor Dr. Syed Arif Kamal

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## PROFILE

***My Philosophy of Life***  
*While there is a will there is a way*

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Professor Dr. Syed Arif Kamal, Professor (BPS-21), Department of Mathematics, University of Karachi, obtained his BSc (Honors) *summa cum laude*, MSc *summa cum laude* and PhD from University of Karachi, MS from Indiana University, Bloomington, USA and MA from the Johns Hopkins University, Baltimore, USA as Quaid-é-Azam Scholar.

His awards and honors include throughout First-Class-First Position and 4 gold medals for scholastic achievements. He is a member of the American Institute of Aeronautics and Astronautics (AIAA), the International Brain Research Organization (IBRO), the Karachi University Senate, Academic Council and Boards of Faculty (Sciences and Arts). As member of Expert Panel on Curriculum of Mathematics, Ministry of Education, Government of Pakistan, he reviewed mathematics syllabi and textbooks for Classes I-XII. He acts as Subject Expert (Mathematics) on the Selection/Interview Boards of University of Balochistan, Pakistan Space

<b>Fourth Law of Thermodynamics</b>		<b>Sixth Paradigm of Physics</b>
<b>Cross Lattice</b>		<b>Intelligent Power</b>
<b>Money (Flow) as a Substance-Like Quantity</b>		
<b>Edge-Based Moiré</b>		<b>Air-Spacecraft of Third Millennium</b>
<b>Brain Death</b>		<b>Anthromathematics</b>

Fig. 1. Notable concepts put forward

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and Upper Atmosphere Research Commission (SUPARCO) and Federal Public Service Commission. He is, also, a referee of *Clinical Biomechanics* (Elsavier) [Impact Factor = 2.036], *Optics and Laser Technology* (Elsavier) [Impact Factor = 1.616], *Journal of Industrial Textiles* [Impact factor = 0.811], *Proceedings of the Pakistan Academy of Sciences* and *Journal of Scientific and Industrial Research*

His research, teaching and administrative experiences in institutions of higher learning and R&D organizations span over 30 years. He had an opportunity to lead teams in 15 capacities, with progressively-increasing responsibilities (motivation, administration, crisis management, conflict resolution, establishment of national projects/laboratories), through his soft skills (communication, presentation, networking, ability to portray vision). A few key positions held by him are Chairman, Department of Mathematics (2003-6), Project Director, the NGDS Pilot Project (1998-present), Chairman, Board of Studies for Mathematics (2003-6), Convener, Program in Industrial and Business Mathematics (2003-6), Acting Convener, Testing Services Committee, University of Karachi (2008-10, during absences of Convener), Convener, National Curriculum Revision Committee (Mathematics), Higher Education Commission (2004-present), which prepared BS, MS and PhD curricula, Convener, Subject Committee (Mathematics), National Testing Service Pakistan (2009-present) and Convener, Sub-Committee (Schools), the Education Committee, Transparency International Pakistan. In addition, he is contributing in grooming future leaders as Program Convener of the Early Talent Research Participation Program, University of Karachi (2002-present). He has 120 papers to his credit (108 as solo/first/corresponding author) in biomathematics, astrodynamics, relativity, physical mathematics and algebra, some of them published in *Biological Cybernetics* [Impact Factor = 1.667], *Journal of Biological Physics* [Impact Factor = 1.373] as well as *Matrix and Tensor Quarterly*.

His contributions to mathematics include defining determinant of a general tensor, introducing cardiac coordinates to study heart function, developing astrodynamical coordinates to study bounded keplarian motion, formulating *Strong Noether's Theorem* to study particle symmetries, suggesting mechanisms to avoid infinities from the Lorentz and the Poincaré Transformations, constructing a minkowski-type metric for curved spacetime, proposing approaches to generalize principle of equivalence and devising new control laws, the extended-cross-product steering, the dot-product steering and the ellipse-orientation steering for spacecrafts and satellites, making mathematical models of brain, heart, spinal column and growth of children. In addition, he has written a critical review of Richard H. Battin's book, "An Introduction to the Mathematics and the Methods of Astrodynamics". Some of the notable concepts put forward by him (cf. Fig. 1) are **the fourth law of thermodynamics**, **the sixth paradigm of physics**, **cross lattice** (generalization of reciprocal lattice — condensed matter physics), **intelligent power** (generalization of soft power and smart power — international relations), **modeling money (flow) as a substance-like quantity** (mathematical economics), **edge-based moiré** (combination of moiré fringe topography and edge-based algorithm — computer vision), **air-spacecraft of the third millennium** (green engineering principles — aeronautics and astronautics), **mathematical definition of brain death** (exploring group structure of covariant model of global electrocortical activity — mathematical neuroscience) and **anthromathematics** (mathematics of body sizes, forms, proportions and structures). *Aerospace, health-care and security technologies* are impacted by his research.

He has given 69 colloquia, guest lectures, presentations and seminars at various institutions of higher learning, including Air War College, the Aga Khan University, Higher Education Commission, the International Center for Chemical and Biological Sciences, the Abdus-Salam International Center for Theoretical Physics, Italy and Massachusetts Institute of Technology, USA. In addition, he has conducted 21 trainings and workshops as well as in-service and professional development courses and organized 15 exhibitions, grand seminars, seminar series and conferences. He was keynote speaker in 2 conferences, invited speaker in 10 conferences, session chair in 8 conferences, panelist (panel discussion) in 2 conferences as well as chief guest in the Sindh Educational Conference (2009). He, also, presided one conference. His biography is listed in Marquis Who's Who in the World, Dictionary of International Biography and 2000 Outstanding Intellectuals of the Twenty-First Century. On November 4, 2010, he shared his life-long achievements as Guest Scientist in the Pakistan Academy of Sciences Karachi Chapter Program.

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