



## Professor Dr. Syed Arif Kamal

MS (Indiana, USA); MA (Johns Hopkins, USA); PhD *Member*, AIAA (USA), IBRO (France)  
*Convener*, NCRC (Math), HEC; Subject Comm. (Math), NTS; Sub-Comm. (Sch.), Educ. Comm., TIP  
*Member*, Expert Panel (Math), National Curriculum Council, Ministry of Education, Govt. of Pakistan  
*Program Convener*, the Early Talent Research Participation Program  
*Member*, Karachi University Senate; Academic Council; Board of Faculty; Board of Studies  
*Project Director*, the NGDS Pilot Project; HEC-Approved PhD Supervisor and *Ex-Chairman*

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## BIODATA

### *My Philosophy of Life*

*While there is a will there is a way*

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### Fields of Interest

- Mathematical and Computer Modeling
- Human Growth and Development
- 3-D Optical Imaging
- Image Processing
- Space-Flight Dynamics and Astrodynamics
- Neural Systems and Neural Networks
- Applicable Physical Mathematics
- Curriculum and Pedagogical Techniques

### Profile

- More than 30 years of research, teaching and administrative experiences in institutions of higher learning and R&D organizations
- Research-Group Leader in Bioinformatics and Space-Flight Dynamics
- Research-Productivity Allowance awarded by HEC (2003)
- 114 papers (102 as solo, first or corresponding author)
- Rated as one of the best teachers in undergraduate and graduate courses; highest rating by experienced college teachers in the Six-Day-In-Service-Training Course (Mathematics for College Teachers) conducted by Higher Education Commission
- 68 colloquia, guest lectures, presentations and seminars given
- 21 trainings conducted; 15 exhibitions, seminar series, conferences organized

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- Profile**  
(continued)
- 125 colleges, conferences, events, short courses, symposia and workshops attended
  - Chief Guest in the Sindh Educational Conference (2009), Panelist (Panel Discussion) in the 12<sup>th</sup> IEEE International Multitopic Conference (2008), Keynote Speaker in 2 conferences, Invited Speaker in 9 conferences, Session Chair in 5 conferences
  - Throughout first-class-first academic career; recipient of 4 gold medals
- Leadership Roles**
- 09/2011-present
- Lead teams in 15 capacities as [*Leadership Vision: Accomplishments and Goals* placed at <<http://www.ngds-ku.org/goals/Univleader.pdf>>]:
  - Convener, Sub-Committee (Schools), the Education Committee, Transparency International Pakistan <<http://www.transparency.org.pk>>
- 2004-present
- Convener, National Curriculum Revision Committee (NCRC) for Mathematics, Higher Education Commission (HEC), Government of Pakistan— BS, MS and PhD curricula prepared <<http://www.ngds-ku.org/hec/ncrc.htm>>
- 2009-present
- Convener, Subject Committee for Mathematics, National Testing Service Pakistan <<http://www.nts.org.pk>>
- 1998-present
- Project Director, the NGDS Pilot Project, KU (University of Karachi)— national-level project being conducted benefiting students studying in civilian schools as well as schools run by the Armed Forces of Pakistan <<http://ngds-ku.org>>
- 2003-2006
- Chairman, Department of Mathematics, KU <<http://www.ngds-ku.org/math/math.pdf>>
- 2003-2006
- Chairman, Board of Studies for Mathematics, KU— BSc, BSc (Honors) and BS curricula prepared and approved
- 2003-2006
- Convener, Program in Industrial and Business Mathematics, KU <<http://www.ngds-ku.org/PIBM/MIBM.pdf>>
- 2008-2010
- Acting Convener, Testing Services Committee, University of Karachi (during absences of convener)
- 1991-1992
- Head, Department of Mathematics and Physics, DHA Degree College, Karachi— established physics laboratory
- 1995-present
- Head, Research Group in Astrodynamics, Department of Mathematics, KU
- 1996-present
- Head, Research Group in Image Processing, Department of Mathematics, KU
- 1998-present
- Head, Research Group in Mathematical Biology, Department of Mathematics, KU
- 2005-present
- Head, Research Group in Mathematical Physics, Department of Mathematics, KU
- 2008-present
- Director, the Syed Firdous Growth and Imaging Laboratory, Department of Mathematics, KU
- Leadership Development**
- 2002-present
- Grooming future leaders as:
    - Program Convener, the Early Talent Research Participation Program, KU <<http://www.ngds-ku.org/subprojects.htm#ETRPP>>
- Professional Mannerism**
- *Setting and Realizing Goals*, by proper planning, execution (breakup into targets), monitoring and evaluation, without compromising ethics and principles (*means* are as important as *goals*)
  - *Achieving Efficiency and Effectiveness* through knowledge, skill and attitude, without affecting relationships
  - *Creating Opportunities* for faculty, staff and students by mentoring and effective delegation, with adequate follow through, follow up and positive re-enforcement
- Strengths**
- Honesty
  - Knowledge
  - Networking Capability
  - Discipline
  - Oral and Written Communication
  - Integrity
  - Ethical and Principled Approach
  - Detail Oriented
  - Devotion and Determination
  - Out-of-Box Thinking

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Academic Summary	Year	Degree or Certificate	Awarding Authority	Percentage of Marks	Division/ Position
	1969	MID	DE	80.7%	First/First
	1971	SSC	BISE	89.1%	First/First <i>Broke BISE record; distinction in all subjects</i>
	1972	IGD	DE	-----	First <i>Prize in Object Drawing for best picture</i>
	1973	HSC	BISE	77.3%	First/First
	1976	BSc (Honors)	KU	95.7%	First/First <i>A<sup>+</sup> grade in all subjects; first position in University of Karachi</i>
	1977	MSc	KU	98.8%	First/First <i>A<sup>+</sup> grade in all subjects; first position in University of Karachi</i>
	1982	MS	IU	-----	----- <i>14 hours of research in Indiana University School of Medicine in addition to 34 credit hours of course work and seminars</i>
	1986	MA	JHU	-----	----- <i>Worked on a project in the Johns Hopkins University Department of Chemical Engineering in addition to course work and seminars</i>
	1993	PhD	KU	-----	----- <i>Developed mathematical models of the human brain, a complex many-body problem: N = 10<sup>15</sup></i>

Legend

■ Degree or Certificate (in alphabetical order):

<b>HSC</b>	Higher Secondary Certificate Examination
<b>MA</b>	Master of Arts
<b>MID</b>	Middle Standard Examination
<b>MS, MSc</b>	Master of Science
<b>PhD</b>	Doctor of Philosophy
<b>SSC</b>	Secondary School Certificate Examination

■ Awarding Authority (in alphabetical order):

<b>BISE</b>	Board of Intermediate and Secondary Education, Hyderabad, Pakistan
<b>DE</b>	Directorate of Education, Hyderabad, Pakistan
<b>IU</b>	Indiana University, Bloomington, Indiana 47405, USA
<b>JHU</b>	The Johns Hopkins University, Baltimore, Maryland 21218, USA
<b>KU</b>	University of Karachi, Karachi 75270, Pakistan

University Education Program of Studies Included

■ The Johns Hopkins University, Baltimore, Maryland, USA

- MA, 1986, *Essay: The Effects of Magnetic Field on Scale Formation*
- General Relativity and Cosmology
  - Advanced Quantum Mechanics
  - Theoretical Mechanics
  - Stellar Structure and Evolution
  - Advanced Laboratory
  - Group Theory

■ Indiana University, Bloomington, Indiana, USA

- MS, 1982, *Project: Monitoring of Scoliosis Patients using Moiré Fringe Topography*
- Quantum Field Theory
  - Classical Electrodynamics
  - Scattering Theory
  - Statistical Mechanics
  - Theory of Gravitation
  - Theory of Elementary Particles

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- University Education (continued)**
- **University of Karachi, Karachi, Pakistan**
  - PhD, 1993, *Dissertation: Spacetime Representation in the Brain*
  - MSc, summa cum laude, 1977, *Thesis: Luxon-Bradyon Transformation*
  - BSc (Honors), summa cum laude, 1976
- Program of Studies Included**
- Classical Mechanics
  - Methods of Mathematical Physics
  - Differential Equations
  - Quantum Mechanics
  - Lattice Dynamics
  - Statistical Techniques
- Pre-University Education**
- Government College, Hyderabad, Pakistan [1971-73]
  - Government Comprehensive High School, Mirpurkhas, Sindh, Pakistan [1966-71]
  - Modern High School, Sukkur, Sindh, Pakistan [1962-65]
- Other Certification Subjects Qualified**
- **Directorate of Education, Hyderabad, Sindh (Pakistan)**
  - Intermediate Grade Drawing Examination, 1972
  - Geometrical Drawing
  - Freehand Drawing
  - Nature Drawing
  - Object Drawing
  - Memory Drawing
  - Design
- Academic Honors**
- **Academic Distinctions:**
  - Throughout first class first position; topped the list of candidates of entire University in BSc (Honors) and MSc semester examinations conducted by University of Karachi
  - Four gold medals for scholastic achievements (these medals included “Philips Electrical Company of Pakistan Gold Medal”, awarded by University of Karachi)
  - **Scholarships awarded:**
  - Merit Scholarship since class nine through MSc [1969-77]
  - The Quaid-é-Azam Scholarship to attend the Johns Hopkins University [1983-86]
- Experience Research**
- **Highlights are listed below:**
  - Research experience in both the industrial and the university environments (Indiana University, the Johns Hopkins University, the Sir Syed University of Engineering and Technology, SUPARCO, University of Karachi.); SUPARCO stands for *Pakistan Space and Upper Atmosphere Research Commission*
  - Papers in ‘3-D-Optical Imaging and Image Processing’, ‘Applicable-Physical Mathematics’, ‘Biomathematics’, ‘Control Theory’, ‘Cosmology’, ‘Electromagnetism’, ‘Many-Body Theory’, ‘Mathematical Modeling’, ‘Relativity’ and ‘Space-Flight Dynamics’
- Teaching**
- Conducted large classes having enrollment of more than 100 students
  - Courses taught included ‘Applicable-Physical Mathematics’, ‘Astrodynamics’, ‘Astronomy’, ‘Anthromathematics’, ‘Biomathematics’, ‘Computational-Linear Algebra’, ‘Dynamical-System Analysis’, ‘Electromagnetism’, ‘Numerical Computing’, ‘Science, Technology and International Relations’ and ‘Space-Flight Dynamics’
- Administration**
- As Chairman, Department of Mathematics, University of Karachi supervised a staff of 33 and over 700 students, in addition to dealing with the university administration
  - Prepared PC-1 forms (with two other mathematics faculty) for the proposed Institute of Mathematical Sciences, University of Karachi [1998], Mathematics Research Facility Wing [2004] and National Center for Mathematics [2004]
  - As Founding Project Director of the NGDS Pilot Project launched a national level project and collected data on over 2500 children [1998-present]; NGDS stands for *National Growth and Developmental Standards for the Pakistani Children*
  - As Head, Department of Mathematics and Physics, DHA Degree College, supervised a staff of 5 and dealt with local suppliers [1991-92] – DHA stands for *Defence Housing Authority*

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- Experience (continued)**
- Managed admissions of MIBM students, Department of Mathematics, University of Karachi [1995-96]; MIBM stands for *MSc (Industrial and Business Mathematics)*
  - Written Semester Activity Reports for Department of Mathematics, University of Karachi [1999]
  - Handled national suppliers at the Albert Einstein College of Medicine [1990]
  - Member of Computer Procurement Committee at SUPARCO (Plant) [1992-93]
- Work History**
- 1995-present
- Listed in reverse-chronological order:
  - **University of Karachi**  
*Karachi, Pakistan*
  - ▣ **Principal Appointment**
    - 2007-present Professor (BPS-21), Department of Mathematics — *Research, Teaching, Administration and Policy-Making*
    - 2001-2006 Professor (BPS-20), Department of Mathematics — *Research, Teaching and Administration*
    - 1995-2000 Associate Professor (BPS-19), Department of Mathematics — *Research, Teaching and Administration*
  - ▣ **Additional Responsibilities**
    - 2004-present Convener, National Curriculum Revision Committee for Mathematics, Higher Education Commission, Government of Pakistan — *Project Management and Coördination*
    - 2003-2006 Chairman, Department of Mathematics — *Administration, Research and Teaching* (full term of 3 years)
    - 2003-2006 Chairman, Board of Studies for Mathematics — *Networking and Coördination*
    - 2003-2006 Convener, Program in Industrial and Business Mathematics, Diploma and Certificate Programs in Mathematics — *Administration, Teaching, Research and Development (R&D)*
    - 2001-present Program Coördinator, the Early Talent Research Participation Program — *Counseling and Guidance*
    - 1998-present Project Director, the NGDS Pilot Project — *Administration, Training, Research and Development (R&D)*
  - ▣ **Interdepartmental Appointments**
    - 2008-2009 Department of International Relations
    - 2006-2008 Department of Chemistry
    - 2004-2006 ISPA (Institute of Space and Planetary Astrophysics)
    - 2004-2006 Department of Physics
    - 1999-2006 Department of Computer Science
  - Planned, organized and conducted seminars and workshops
  - Prepared PC-1 forms for development projects
  - Represented department in various forums
  - **Pakistan Space and Upper Atmosphere Research Commission**  
*SUPARCO (Plant), Karachi (Pakistan)*
  - 1992-1995 Senior Scientific Officer (Group IX), Control Systems Laboratories — *Research and Development (R&D)*
    - Mathematical modeling and dynamics of aerospace systems
  - **DHA (Defense Housing Authority) Degree College**  
*Karachi, Pakistan*
  - 1991-1992 Assistant Professor and Head (BPS-18), Mathematics and Physics — *Administration, Teaching and Research*
    - Established Physics Laboratory

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- Work History**  
(continued)
- 1986-1990
- **University of Karachi**  
*Karachi, Pakistan*
  - 1988-1990 Assistant Professor (BPS-18), Department of Physics — *Research and Teaching* [leave-vacancy appointment]
  - 1986-1988 Coöperative Teacher, Department of Physics— *Research and Teaching* [full-time-contract appointment]
  - Introduced discussion and problem-solving sessions in courses
  - **The Johns Hopkins University**  
*Baltimore, Maryland, USA*
  - 1983-1986
  - 1984-1986 The Quaid-é-Azam Scholar — *Research*
  - 1983-1984 Teaching Assistant, Department of Physics — *Research and Teaching*
  - Mathematical modeling of chemical and physiological systems
  - Conducted Freshman Laboratory of Physics  
*Both concurrent with graduate education*
  - **University of Oklahoma**  
*Norman, Oklahoma, USA*
  - 1982-1983
  - Teaching Assistant, Department of Physics and Astronomy— *Research and Teaching*
  - Mathematical modeling of physical and physiological systems
  - Conducted recitation sessions of Freshman Physics
  - Graded courses in Physics and Engineering Physics  
*Concurrent with the graduate education*
  - **Indiana University**  
*Bloomington, Indiana, USA*
  - 1979-1982
  - Associate Instructor, Department of Physics — *Research and Teaching*
  - Research in mathematical physics and mathematical modeling
  - Graded undergraduate and graduate courses in Physics  
*Concurrent with graduate education*
  - **Karachi Grammar School**  
*Karachi, Pakistan*
  - 01/1979-05/1979
  - Assistant Master and Head, Mathematics and Physics
  - Taught GCE (Cambridge) O-Level Mathematics and A-Level Physics
  - Responsible for Physics Section of the Einstein Centenary Science Exhibition, Karachi Grammar School, Karachi [March 1979]
- Visiting Positions*
- Listed in alphabetical order:
  - **The Aga Khan University**  
*Karachi, Pakistan*
  - 1996-2006
  - Sessional Faculty, Preparatory-Year Program, 1996-2006; PhD Program, 1998-99
  - Developed and taught courses of Mathematics, Physics and Biostatistics (Preparatory-Year Program)
  - Designed and taught an integrated course “Biomedical Mathematics and Physics” (PhD Program)
  - **The Albert Einstein College of Medicine**  
*Bronx, New York, USA*
  - 1990
  - Visiting Postdoctoral Fellow, Structural Biology and Biophysics
  - Image processing of biomolecules
  - **The Hamdard Institute of Information Technology**  
*Karachi, Pakistan*
  - 1999
  - Visiting Faculty at the City Campus
  - Designed and taught Basic Physics to Bachelors in Information Technology students

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- Work History**  
(continued)
- 1999
    - IBA (Institute of Business Administration)  
*Karachi, Pakistan*  
Visiting Faculty at City Campus
    - Developed and taught Freshman Physics for Bachelors in Computer Science students
  - 2005-present
    - IST (Institute of Space Technology)  
*Islamabad, Pakistan*  
Visiting Faculty, Department of Aeronautics and Astronautics
    - Conducted Professional-Development-Short Courses “Astrodynamics for Space Technologists” (2005) and “Guidance, Navigation and Control of Spacecraft” (2006)
  - 1988
    - Lunds Universitet (University of Lund)  
*Malmö General Hospital, Malmö, Sweden*  
Associated Professor, Spinal Unit
    - Developed and tested moiré systems
  - 1988
    - The Lyceum Institute of Engineering and Computer Science  
*Karachi, Pakistan*  
Visiting Faculty
    - Taught Mathematics and Statistics to diploma students
  - 1988
    - The Lyceum School  
*Karachi, Pakistan*  
Visiting Faculty
    - Taught GCE (Oxford) A-Level Physics
  - 1993-1995
    - The Sir Syed University of Engineering and Technology  
*Karachi, Pakistan*  
Research Group Leader, Biomechanics Research Laboratory
    - Supervised research on biomechanics of the human spinal column
  - 1998-2001
    - SZABIST  
*Karachi, Pakistan*  
Visiting Faculty
    - Designed and taught Mathematics for Business to BBA (Honors) students
    - Designed and taught Computing Mathematics to MCS students
  - 1995-1996
    - The Usman Institute of Technology  
*Karachi, Pakistan*  
Visiting Faculty
    - Taught Freshman Physics to Bachelors in Computer Science students
- Accomplishments**
- May be summarized as:
    - Defined determinant of a general tensor (at Indiana University, Bloomington)
    - Introduced cardiac coördinates to study heart function (at KU)  
[KU stands for *University of Karachi*]
    - Developed astrodynamical coördinates to study bounded keplarian motion (at KU)
    - Presented the concept of a dimensionless reciprocal lattice [industrial mathematics/materials science] (at KU)
    - Developed an ellipsoidal model of the human heart [biomechanics] (at KU)
    - Evolved 3-D static and dynamic models of the human spinal column [biomechanics] (at KU)
    - Modeled planetary orbits using elliptic-astrodynamical coördinates [astrodynamics] (at KU)
    - Constructed a model to explain the effects of magnetic fields on scale formation [industrial mathematics] (at the Johns Hopkins University)
    - Formulated *Covariant-Generalized-Coupling Model* of global electrocortical activity [mathematical neuroscience] (at KU)
- Physical Mathematics*
- Mathematical and Computer Modeling*

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- 3-D-Optical Imaging and Image Processing*
- Applied moiré fringe topography and rasterstereography to study posture and gait of children (at KU)
  - Developed (at KU) and validated (at Malmö General Hospital) a reproducibility criterion for moiré topographs
  - Installed on DEC WINDOWS and ran SPIDER (System for Processing Image Data in Electron Microscopy and Related Fields) to align images of flagella of ST-1: Salmonella Typhus (at the Albert Einstein College of Medicine)
  - Developed a technique to simultaneously analyze human gait using moiré fringe topography and rasterstereography (at KU)
  - Combined edge-based algorithm and moiré fringe topography to analyze motion in the sagittal plane (at KU)
- Relativity and Theory of Elementary Particles*
- Proposed techniques to avoid infinities from the Lorentz and the Poincaré transformations
  - Extended special theory of relativity (by introducing periodic functions) to include speed ranges  $c$  to infinity (at Indiana University, Bloomington)
  - Formulated *Strong Noether's Theorem* (at KU)
  - Studied behavior of massive particles near and beyond the speed of light (at Indiana University, Bloomington and at KU)
  - Devised *Luxon-Bradyon Transformation*, which could be used to convert a luxon equation into a bradyon equation (at KU)
- Astronomy and Cosmology*
- Obtained solution of the Einstein equation in cosmology by a new method (at KU)
  - Suggested violation of *Kepler's Second Law of Planetary Motion* based on the observations of total solar eclipses which occurred on October 24, 1995 and on August 11, 1999 (at KU)
- Space-Flight Dynamics*
- Developed an equation of motion for keplerian orbits in astrodynamical coordinates (at KU)
  - Introduced a variable TYPE in the Lambert Scheme to generate the correct sign for transfer time of satellites (moons) orbiting in a direction opposite to the direction of planet rotation (at KU)
  - Devised multi-stage-Q system and the inverse-Q system for possible application in satellite-launch vehicle (at KU)
- Electromagnetism*
- Formulated control laws for spacecrafts in keplerian orbits (at KU)
  - Treated electrical and magnetic activity of the brain using a covariant formulation (at KU)
  - Obtained *Ohm's law* for relativistically-streaming plasmas containing dyons (at KU)
- Many-Body Theory*
- Developed mathematical models of a complex many-body system ( $N \approx 10^{15}$ ) — signal transmission in the human brain (at KU)
- Professional Honors**
- **Professional Distinctions:**
    - HEC-Approved PhD Supervisor
    - Appointed Assistant Professor (1989), Associate Professor (1995) and Professor (2001), all of them **NUMBER ONE**, according to merit list, by KU Syndicate
  - **Awards:**
    - Research-Productivity Allowance awarded for the year 2003 by HEC
    - 8 research grants (KU 7; Sir Syed University of Engineering and Technology 1)
    - Department of Mathematics, University of Karachi won a grant of Rupees 2 million, annually, (for 3 consecutive years) from National Center for Mathematics, during the tenure of my Chairmanship (2003-2006)

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- Professional Honors (continued)**
- **Biography (appears in):**
    - Marquis Who's Who in the World (USA) [fifteenth edition];
    - Marquis Who's Who in Asia [first edition]
    - Marquis Who's Who in Science and Engineering [tenth edition]
    - Dictionary of International Biography (UK) [twenty-seventh edition]
    - 2000 Outstanding Intellectuals of the Twenty-First Century (UK)
- Professional Activities**
- Professional activities at a glance during a career spanning over twenty seven (27) years:
    - **Policy-Making Bodies:**
      - Subject Committee for Mathematics, National Testing Service Pakistan, *Convener*
      - Committee to Investigate Plagiarism, University of Karachi, *Member*
      - Expert Panel on (Pre-University) Curriculum of Mathematics, National Curriculum Council, Ministry of Education, Government of Pakistan, *Member*
      - PhD-Program-Curriculum-Formulation Committee (Physics), Federal Urdu University of Arts, Sciences and Technologies, *Member*
      - National-Computing-Education-Accreditation Commission (Mathematics), *Secretary* (committee to evaluate documents for establishment of the Commission)
      - National Curriculum Revision Committee for Mathematics, Higher Education Commission, *Convener*
      - Board of Governors, DEWA Academy, *Member*
      - Board of Studies (Chemical Engineering), University of Karachi, *Member*
      - Senate, University of Karachi, *Member*
      - Academic Council, University of Karachi, *Member*
      - Board of Faculty (Arts), University of Karachi, *Member*
      - Board of Faculty (Science), University of Karachi, *Member*
      - Board of Studies (Mathematics), University of Karachi, *Member* [chaired during 2003-2006]
    - **Policy-Implementing Bodies:**
      - Erasmus Mundus, Action 2, Strand 1, European Union Project, *Administrator for University of Karachi*
      - Research-Project-Evaluation Committee, Dean, Faculty of Sciences, University of Karachi, *Member*
      - Testing Services Committee, University of Karachi, *Member and Acting Convener* (during absences of Convener)
      - Review Committee (Manuscripts/Textbooks prepared according to National Curriculum 2006), Curriculum Wing, Ministry of Education, Government of Pakistan, *Member*
      - Review Committee (to validate 'Q Bank'), Dow University of Health Sciences, Karachi, *Member*
      - Affiliation Committee, University of Karachi, *Subject Expert* (Mathematics)
      - Moderation Committee (Mathematics), University of Karachi, *Member* [chaired during 2003-2006]
- Examinations**
- **Paper Setter and Head Examiner of University of Karachi Examinations:**
    - MA (External Examinations)
    - MA/MSc (Colleges Examinations)
    - BCS/BSSE (Colleges Examinations)

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- Professional Activities (continued)**
- Trainings, Workshops, In-Service and Professional-Development-Short Courses Organized/Conducted/Evaluated*
- Proposed and developed an undergraduate and graduate physics curriculum (cf. seminar given "The making of a physicist" and paper "J09: Basic requirements to train a physicist") [1986-87] (at KU)
  - Conducted a survey of the school and the pre-university physics education in Pakistan (cf. paper "C28: A survey of school and pre-university physics education in Pakistan") [1987] (at KU)
  - **Professional Development:**
    - Visiting Tutor, "Organization and Reengineering of Schools", In-Service Training INSET 2010, Department of Professional Development, the City School Southern Region, PAF Chapter Campus, Karachi [October 15, 16, 2010]
    - Instructor, "Mission Design for Satellite-Launch Vehicle" [August 25-29, 2008], "Guidance, Navigation and Control of Spacecraft" [August 14-19, 2006] and "Astrodynamics for Space Technologists" [August 22-26, 2005], Professional-Development-Short Courses, Institute of Space Technology, Islamabad
    - Coördinator, "Workshop on Preparing Research Proposals", [April 16, 2008], Office of Dean, Faculty of Sciences, University of Karachi
    - Instructor, "Research Methodology", [November 21-24, 2007], Graduate Studies Course, Faculty of Arts, University of Karachi
    - Instructor, "Astrodynamics and Flight Dynamics", [May 7-11, 2007], Professional Development Short Course, Training Division, Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), Karachi
    - Facilitator, "Communication and Presentation Skills", Engro Asahi Polymer and Chemicals Limited, Karachi [April 6, 2005]
    - Conducted Professional Development Course for Coöperative Teachers of Department of Mathematics covering topics like, "Time Management", "Goal Setting" and "Relationship Strategies (based on analysis of management styles)" [January 3-28, 2005] (at KU)
    - Short trainings on "Presentation Skills" and "Behavior-Based Interviewing Skills" for MSc, MIBM, MPhil and PhD students [2004-5] (at KU)
  - **Teachers' Trainings:**
    - Course Coördinator, Six-Day-In-Service-Training Course (Mathematics for College Teachers), HEC Regional Office, Karachi [August 16-21, 2004] — **highest rating** by participants as facilitator
    - Resource Person for the module "Correction Strategies at the Intermediate Level", Commecs Educational Trust, Karachi [April 17, 2004]
    - Subject Expert (Mathematics), FDP Intensive Workshop, Commecs Institute of Business and Emerging Sciences, Karachi [1999]
    - Master Trainer, Science Teachers' Training, the International School, Clifton, Karachi [1997]
    - Member, Organizing Committee, "National Workshop on Teaching of Physics", Department of Physics, APWA Government College for Women, Karachi [December 26-28, 1987]
    - Contributed in training of physics teachers of local colleges through "The Second Workshop on Teaching of Physics" [1986] and "The Second International Conference on Physics Teaching" [2003]

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- Professional Activities (continued)**
- **Technical Trainings at SUPARCO (Plant), Karachi:**
    - Basic Training Course (Mechanical) for newly-inducted assistant managers *holding basic engineering degree* (Lectures in "Applied Mathematics and Space-Flight Dynamics") [September 11-20, 2002]
    - Orientation Program for newly-inducted assistant engineers and scientific officers (Lectures in "Mathematical Methods for Space-Flight Dynamics") [September 5-15, 1994]
  - **Health-Professional Trainings:**
    - Conducted seminar for residents in Postgraduate Training Programs, Departments of Pediatrics, the Aga Khan University Medical College, Karachi [April 24, 2002] and the Nishtar Medical College, Multan [March 22, 2004]
    - Trained master trainers of the Aga Khan Foundation's "Tawana Pakistan" Project in child anthropometry [April 2003]
    - Trained students and faculty of Department of Special Education, University of Karachi in child anthropometry [November 2006]
  - **Talent-Farming Scheme:**
    - Delivered 2 lectures during the Summer School for BSc and MSc students conducted by HEC Regional Center, Karachi [July 12-20, 2004] — See, also, ETRPP [page 12]
  - **Astronomical Observations:**
    - Department of Mathematics, University of Karachi
    - Head of the Astronomy Program <<http://www.ngds-ku.org/solar/eclipse1.htm>>
    - *The 2008-Partial-Solar-Eclipse Expedition, Karachi, Pakistan*  
Images of this expedition are available on homepage
    - *The 2006-Partial-Solar-Eclipse Expedition, Karachi, Pakistan*  
Studied effects on temperature, wind pattern and bird behavior
    - *The 1999-Total-Solar-Eclipse Expedition, Karachi, Pakistan*  
Coverage in "the Jang" on August 12 and "the News International" on August 13
    - *The 1995-Total-Solar-Eclipse Expedition, Ahmadpur East, Punjab, Pakistan*  
Coverage in the JANG on October 23 and 25
  - **Book Reviews:**
    - Shaukat Abbas, *Ashwai Amaleé (Stochastic Processes)*, Federal Urdu University Press, 2007 (confidential review requested by publisher)
    - Richard H Battin, *An Introduction to the Mathematics and the Methods of Astrodynamics*, AIAA Education Series, New York, 1987 and 1999: available at <[amazon.com](http://amazon.com)> and my homepage (Research Section) — original review in 1993 <<http://www.ngds-ku.org/Papers/Battin.pdf>>
    - Sara Naqvi, *Insaan aur Kainaat* (Man and the Universe), Oxford University Press, Karachi, 1999
    - Syed Muhammad Ismail Raza Zabih Tirmizi, *Hyaat-é-Nabouvi ke Sahih Jantiri* (Correct Chronology of Life of Our Holy Prophet - peace be upon him). Al-Awan Printers, Haripur, KP (Pakistan), 1991
  - **Research-Journal Referee:**
    - Clinical Biomechanics, published by Elsevier [Impact Factor=1.800] (affiliated with the International Society of Biomechanics, the American Society of Biomechanics, the European Society of biomechanics and the Taiwanese Society of Biomechanics) [Impact Factor=2.000]
    - Optics and Laser Technology, published by Elsevier
    - Journal of Basic and Applied Sciences, published by Educational Forum, University of Karachi
- Youth Motivation**
- Astronomy Program**  
1995-present  
August 1, 2008  
March 29, 2006  
August 11, 1999  
October 24, 1995
- Books and Journals**  
2005  
2003  
1999  
1994

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- Professional Activities (continued)**
- Journal of Scientific and Industrial Research, published by PCSIR (Pakistan Council of Scientific and Industrial Research)
  - Karachi University Journal of Science
  - Proceedings of the Pakistan Academy of Sciences
- Research Grants**
- 2007-2008
    - **University of Karachi, Karachi, Pakistan**
    - Pattern recognition using moiré fringe topography
  - 2006-2007
    - Pattern recognition using rasterstereography
  - 2005-2006
    - The Lambert scheme for steering a satellite-launch vehicle (SLV)
  - 2004-2005
    - To model satellite orbits
  - 2002-2003
    - To model growth of the Pakistani children
  - 1997-1998
    - To model planetary orbits
  - 1996-1997
    - To develop moiré systems (with Naseeruddin, Assistant Professor of Physics)
    - **The Sir Syed University of Engineering and Technology, Karachi, Pakistan**
    - To establish Biomechanics Research Laboratory (with Dr. Junaid Ahmad Zubairi, Associate Professor of Computer Science)
  - 1994-1995
    - *Adult-Height and Adult-Weight Formulae for the Pakistani Population*  
Jamil N, MPhil Thesis, 2009
    - *Validity of Various Techniques of Moiré Fringe Topography*  
Ansari SA, MPhil Thesis, 2008
    - *Validity of Various Techniques of Rasterstereography*  
Khan MA, MPhil Thesis, 2008
    - *Physics and Geometry of Heart-Sound Quadrilateral*  
Wasim M, MPhil Thesis, 2007
    - *Magnetobiology for Generalized-Covariant and Generalized-Coupling Models*  
Naeem M, MSc Thesis, 1990
    - *Effects of Gravitational Field on the Electrocortical Activity of Brain*  
Ahmed SN, MSc Thesis, 1990
- Theses Supervised**
- National-Level Project**
- 1998-present
    - **The NGDS Pilot Project**  
Establishment of "National Growth and Developmental Standards (NGDS) for the Pakistani Children" <URL: <http://www.ngds-ku.org>; e-mail: [info@ngds-ku.org](mailto:info@ngds-ku.org)>  
*Founder, Project Director and Principal Investigator*
    - Project undertaken under the directives of His Excellency, the Governor of Sindh/Chancellor, University of Karachi at the institutions run by the Army, the Air Force and the Navy
- Subprojects of the NGDS Pilot Project**
- 2001-present
    - **The Early Talent Research Participation Program (ETRPP)**  
A subproject of the NGDS Pilot Project  
High-School Students are introduced to the ongoing research programs of University of Karachi  
*Program Coördinator*
    - **The NGDS Student Internships**  
Pre-University Students participate in the ongoing research programs of University of Karachi  
*Program Coördinator*
  - 2003-present
    - **The Sibling Growth Pilot Project (SGPP)**  
*Project Director and Principal Investigator*
- Seminar Series Organized**
- 2005-2006
    - **The (Fortnightly) Professional-Skills-Development-Seminar Series**  
Department of Mathematics  
*Convener*
    - Preparing students to enter professional life by equipping them with the skills needed by a potential employer

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- Professional Activities**  
(continued)
- 2003-2006
    - The (Weekly) MPhil/PhD-Seminar Series**  
Department of Mathematics  
*Convener*
      - Cultivating habits of creative thinking and critical analysis through student presentations in front of faculty and fellow students
      - Faculty lectures on research methodology, research-proposal writing, etc.
    - 2003-2006
      - **The (Weekly) Research-Seminar Series**  
Department of Mathematics  
*Convener*
        - Introducing PhD, MPhil and MSc (Final) students to cutting-edge-mathematical Problems in basic and applied mathematics and related sciences
      - 2003-2006
        - **The (Weekly) Students'-Seminar Series**  
Department of Mathematics  
University of Karachi  
*Convener*
      - 1995-1996
        - Program Coördinator*
          - Polishing students' presentation skills by allowing them to give talks in front of faculty and fellow students
          - Starting academic year 2011, First-Year-Seminar Series has been initiated to introduce cutting-edge mathematics research and encourage creative thinking in The freshly-admitted BS students
      - 2003-2006
        - **The (Weekly) MIBM-Seminar Series**  
Department of Mathematics  
*Convener*
      - 1995-1996
        - Program Facilitator*
          - Broadening horizon of MIBM students by arranging talks of active researchers as well as professionals in industrial, business and financial sectors
- Exhibitions, Grand Seminars, Seminar Series and Conferences Organized**
- Member, Advisory Committee, "The First National Conference on Mathematical Sciences", Department of Mathematics, University of Karachi [March 22, 2010]
  - Member, Organizing Committee, "The Thirty-Fifth All Pakistan Science Conference", Faculty of Science, University of Karachi [December 20-23, 2008]
  - Chief Organizer, "Awards Seminar", Department of Mathematics, University of Karachi [January 28, 2006] — Chief Guest: Vice Chancellor
  - Member, Organizing Committee, "Space Science and Challenges of the Twenty-First Century", ISPA-SUPARCO Collaborative Seminar (in connection with World Space Week), University of Karachi [November 21, 2005]
  - Chief Organizer, Guest Research Seminar, "A New Equation Describing Heat Conduction", Department of Mathematics, University of Karachi [August 6, 2005]; Keynote Speaker: Professor Dr. K. Razi Naqvi, Norwegian University of Science and Technology, Trondheim — Chief Guest: Vice Chancellor
  - Chief Organizer, "Industrial and Business Mathematics in the Third Millennium", MIBM Grand Seminar, Department of Mathematics, University of Karachi [May 17, 2004]
  - Revived MIBM, Research and Students' Seminar Series; initiated MPhil/PhD and Professional-Skills-Development Seminar Series during my tenure of chairmanship of Department of Mathematics, University of Karachi [2003-2006]
  - Designed and prepared display for the stall of Department of Mathematics at the University of Karachi Alumni Reunion [February 28 and March 1, 1998]

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- Exhibitions, Grand Seminars, Seminar Series and Conferences Organized (continued)**
- Member, Organizing Committee, “The PIBM-SCL Seminar — Application of Mathematics in the Financial Markets”, Department of Mathematics, University of Karachi [January 13, 1996]
  - Organized (with Dr JA Zubairi) a (monthly) seminar series at SUPARCO (Plant), Karachi [1992-93]
  - Chief Organizer, Physics Section, the Einstein Centenary Science Exhibition, Karachi Grammar School, Karachi [March 1979]
- Skills**
- Written and verbal *English Communication* like a native speaker
  - Excellent interpersonal skills
  - Can recite the Holy Quran with ‘*tajweed*’ (recitation *hafs-al-asim*)
- Human-Resource**
- Team Management and Leadership
  - Goal Setting and Achieving
  - Creative Thinking
  - Problem Solving
  - Technical Writing
- Project Related**
- Mentoring
  - Behavior-Based Interviewing
  - Critical Analysis
  - Project Management
- Networking**
- Seminar-Series Organization
  - Communication Skills
  - Relationship Building
  - Workshop Organization
  - Presentation Skills
  - Conflict Resolution
- 3-D Imaging and Image Processing**
- **3-D-Optical-Imaging Techniques:**
    - Moiré Fringe Topography
    - Holography
    - Rasterstereography
  - **Image-Processing Package:**
    - SPIDER (System for Processing Image Data in Electron Microscopy and Related Fields)
- Mathematical**
- Natural ability to formulate a problem using mathematical framework
  - Mathematical modeling of physical, physiological and engineering problems
  - SPSS (Statistical Package for Social Sciences)
- Statistical Computing**
- **General:**
    - PC Administration
    - Interfacing
    - Installation
    - Database Management
    - Networking
    - Wordprocessing
  - **Languages:**
    - FORTRAN 77
    - DCL
    - BASIC
  - **Systems, Environments and Packages:**
    - DOS
    - VAX/VMS 5.2
    - OFFICE 2000 (Word, Power Point)
    - WINDOWS (98, XP)
    - VAXstation 3100
    - DEC Windows/DECnet
  - **Web:**
    - Designing
    - Maintenance
    - Development
- Laboratory**
- **The Johns Hopkins University, Baltimore (USA)**  
Advanced Laboratory, 1983-84
    - Computerized-Data Collection
    - Mössbauer Spectroscopy
  - **The Albert Einstein College of Medicine, New York (USA)**  
Biophysics Laboratory, 1990
    - Workstation Networking
    - Fast Freeze
    - Microscope
    - Image Processing
    - Ultracentrifuge
    - Spectrophotometer

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- Western Languages**
- English*
  - French*
  - Russian*
- *Fluent in English, constantly improving expertise in French*  
Listed in alphabetical order:
- Educated and worked in the United States of America for 8 years, also medium of instruction and research at University of Karachi
  - Completed 5 courses in French at the Alliance Française de Karachi; equivalent to 175 hours of instruction + conversation course (very formal language, especially in the use of the definite and the indefinite articles)
  - Passed Russian Language Course as well as Physics and Astronomy Department Language Examination at the Johns Hopkins University (USA)
- Eastern Languages**
- Arabic*
  - Hindi*
  - Persian*
  - Urdu*
- *Fluent in Urdu, constantly improving expertise in Arabic*  
Listed in alphabetical order:
- Passed Intermediate Level Course (2-years instruction) at MSA Chapter of Indiana University, Bloomington (USA)
  - Can comprehend spoken language and most of the alphabet (has a very strong phonetic system: the written word corresponds, exactly, to the sound produced)
  - Passed Persian paper (3-years instruction) in the Middle Standard Examination
  - Mother tongue
- Community**
- Interaction with the community through media and public appearances:
- **Public Appearances**
- March 9, 2011 • Guest of Honor, Inter Branch Tournaments 2011, the City School, Southern Region, Physical Education Department, Karachi
  - February 20, 2009 • Judge, Mathematics Category, Science Olympiad, the Aga Khan Higher Secondary School, Karachi
  - April 19, 2008 • Guest of Honor, Annual-Prize-Distribution Ceremony 2008, Government Degree College, Malir Cantonment, Karachi
  - March 7, 2008 • Judge, Mathematics Category, Science Olympiad, the Aga Khan Higher Secondary School, Karachi
  - January 31, 2008 • Judge, Electrical Engineering Category, Poster Session 2008, ACM Student Chapter, Usman Institute of Technology Computer Society, Karachi
  - January 24, 2008 • Chief Guest, Jalsa-é-Seerat-un-Nabi (Day of Our Holy Prophet: Peace be Upon Him), Government Degree College, Malir Cantonment, Karachi
  - August 20, 2007 • Guest of Honor, Independence Celebration, Markaz-é-Umeed (school for special children), Federal 'B' Area, Karachi (opening remarks of the function)
  - March 26, 2006 • Chief Guest, Outstanding-Achievers-Celebration Function, Beacon Light Academy, Karachi
  - March 25, 2006 • Chief Guest, Annual-Prize-Distribution Ceremony 2006, Government Degree College, Malir Cantonment, Karachi
- **Media**
- April 12, 2009 (1815h) • *Quran Aur Science* (Quran and Science), Indus News TV Recorded on April 7, 2009 (paths in the sky)
  - March 1, 2009 (2315h) • *Quran Aur Science* (Quran and Science), Indus News TV Recorded on February 27, 2009 (the death of sun)
  - February 3, 2009 (2110h) • *Bazm-é-Talba* (Students' Assembly), Radio Pakistan I, Karachi, 828 MHz Recorded on February 2, 2009 (career opportunities in mathematics)
  - February 3, 2009 (1930h) • *Bhaid* (Mystery), Express News TV Recorded on January 13, 2009 (light)
  - January 6, 2009 (1930h) • *Bhaid* (Mystery), Express News TV Recorded on December 27, 2008 (black hole)

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- November 14, 2008 (1930h) • *Quran Aur Science* (Quran and Science), Indus News TV (universe and cosmos)
- July 12, 2008 (1910h) • *Aap Bataen ya Hum* (You Tell or We), Indus News TV Recorded on July 1, 2008 (expansion of universe, contribution of Muslims to theory of relativity)
- June 28, 2008 (1910h) • *Aap Bataen ya Hum* (You Tell or We), Indus News TV Recorded on June 18, 2008 (orbits of planets, centrifugal and centripetal forces)
- May 13, 2008 (1630h) • *Science and Technology*, Geo News TV Recorded on May 3, 2008 (science policy)
- June 24, 2007 (1605h) • *Bil-Mushafa* (Face to Face), Radio Pakistan I, Karachi, 828 MHz Recorded Interview (growth modeling of children) <<http://www.ngds-ku.org/media/Bil-Mushafa.htm>>
- December 19, 2006 (1200h-1300h) • *Aik Mukammal Gharana* (A Complete Household), Apna Karachi FM 107 Live Interview (the NGDS Pilot Project)
- June 5, 2006 (recording date) • *Muslim Scientists*, Aaj TV (Muslim mathematicians)

**Co-Curricular**  
*Undergraduate*

- Co-curricular activities at a glance:
- Head, the Physics Society Scientific Committee, University of Karachi [1975-76]
- Obtained donation of books from the American Center Library, Karachi for Theoretical Physics Research Section, Department of Physics, University of Karachi [1976]
- Prize in the Karachi University Science Fair [1976]
- Social Secretary, Scientific Council, the Karachi University Students Union [1974-75]

*Secondary School*

- Class monitor [1970-71]
- Prizes in general-knowledge competition, elocution contests and essay competitions [1966-70]

*Primary School*

- Delivered welcome speech in front of *President of Pakistan* at the age of 8 years [1964]

*Preschool*

- Speaking in public since 3-year old [1959]
- Public speeches in front of an audience of over 25 000 [1960-61]

*Memberships*

- The Alumni Association of Government College, Hyderabad (Sindh), Pakistan [2002-present]
- Bazm-é-Sciencee Adab (Forum for Literature on Scientific Topics), Karachi [2007-present]

**Personal**

- *Father:* (Late) Mr Syed Ishtiaq Raza, MA, Bed (an educationist)
- *Mother:* (Late) Mrs Asia Khatoon
- *Sex:* Male
- *Blood Group:* A+
- *Marital Status:* Married, one child

- *Star:* Gemini
- *Born:* May 23, 1956

*Countries Visited*

- *Asian:* India, Saudi Arabia
- *North American:* USA
- *European:* Austria, Germany, Italy, Sweden

*Hobbies*

- Science awareness in the society
- Photographing landscape
- Traveling and studying various cultures

**Lists Provided Separately**

- Publications
- Colloquia, Guest Lectures, Presentations and Seminars Given
- Colleges, Conferences, Events, Seminars, Symposia and Workshops Attended

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