کراچی یونیورسٹی

University of Karachi

Department of Mathematics

THE NGDS PILOT PROJECT

ANTHROMATHEMATICS 2014
THE SECOND CONFERENCE ON ANTHROMATHEMATICS AND SPORT MATHEMATICS IN THE MEMORY OF (LATE) HUSSAIN AHMED BILGIRAMI

Thursday, September 4, 2014

UNIVERSITY OF KARACHI (UOK)

University of Karachi (UOK), largest in the country in terms of student enrolment and number of PhDs produced, is located in the heart of Karachi, the financial and the business center of Pakistan. UOK offers baccalaureate to doctoral and post-doctoral programs in a wide range of subjects. With prestigious institutions like the HEJ Research Institute of Chemistry and the Applied Economic Research Center, UOK is one of the premier universities of this country. With a campus spanning over 1200 acres, UOK presents a

Table 1. New branches of mathematics introduced by faculty of Department of Mathematics

#	*Name of Branch*	*Date Introduced*	*First Mention*
1	**Anthromathematics**	**March 22, 2010**	http://www.ngds-ku.org/Presentations/Firdous.pdf
2	Astromathematics	October 8, 2012	http://www.ngds-ku.org/Presentations/ISPA.pdf
3	Anthrotopology	December 27, 2012	http://www.ngds-ku.org/Presentations/BZU1.pdf
4	Condensed-Matter Mathematics	December 28, 2012	http://www.ngds-ku.org/Presentations/BZU.pdf
5	Anthroalgebra	April 10, 2013	http://www.ngds-ku.org/Presentations/AMTM.pdf
6	Anthrogeometry	April 10, 2013	http://www.ngds-ku.org/Presentations/AMTM.pdf
7	Anthrodynamics	April 10, 2013	http://www.ngds-ku.org/Presentations/AMTM.pdf
8	Anthroimaging	September 5, 2013	http://www.ngds-ku.org/Presentations/Scan.pdf

ABBREVIATIONS

GCH: Government College, Hyderabad http://gch.edu.pk
MUET: Mehran University of Engineering and Technology
NGDS: National Growth and Developmental Standards for the Pakistani Children http://ngds.uok.edu.pk
NTS: National Testing Service http://www.nts.org.pk
SU:: University of Sindh http://www.usindh.edu.pk
UOK: University of Karachi http://www.uok.edu.pk

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PROF. DR. SYED ARIF KAMAL
PhD (Mathematical Neuroscience);
MA, Johns Hopkins, Baltimore, MD, USA
Head, *Anthromathematics Group*;
Convener,
Program in Anthromathematics and Sport Mathematics;
Chairman,
Department of Mathematics
University of Karachi
and
Member, *Subject Committee for Physical Education, Health and Sport Sciences*, **NTS Pakistan**

MESSAGE OF THE CHAIRMAN

The Twenty-First Century is the century of biological sciences. However, medical sciences are deaf and dumb without the power of mathematics and physics in the Third Millennium. Department of Mathematics, University of Karachi has taken up the challenge by establishing a strong Anthromathematics Group. Staring this year, Program in Anthromathematics and Sport Mathematics is being introduced, as per recommendations of the First Conference on Anthromathematics held on September 4 and 5, 2013. This program consists of MSc in Sport Mathematics, MSc in Anthromathematics as well as MPhil and PhD in Anthromathematics and Sport Mathematics. A paper was presented during the First Conference, which gave a mathematical solution of the childhood-obesity epidemic faced by the United States of America, as declared by the First Lady of US, Her Excellency Michelle Obama. The Second Conference, organized on Thursday, September 4, 2014 in collaboration with Government College, Hyderabad, shall be covering mathematical solutions for childhood obesity, face-recognition techniques in security-and-background rating system as well as crystal-structure-concept-based modeling of the human spinal column validated through 3-D-bone scanning .

breathtaking view and a pollution-free environment, if one wants to get away from smog of the city.

DEPARTMENT OF MATHEMATICS

Established in 1956, Department of Mathematics was fortunate to have Prof. Dr. Suleman Kerawala as its Founder Chairman. Prof. Dr. Syed Arif Kamal, revived 3 seminar series, and initiated 2 new seminar series during his first full three-year term as Chairman during 2003-6. In 2012, he has been appointed, again, as Chairman, Department of Mathematics. During his second term he has revived *Conferences on Mathematical Sciences* (the second one held on **Thursday, March 20, 2013** and the third one is planned to take place on **Thursday, March 19, 2015**) and initiated a new series of *Conferences on Anthromathematics and Sport Mathematics* (the first one held on **Wednesday and Thursday, September 4 & 5, 2013**).

Programs Offered

Third Millennium challenges of the knowledge-based economy make it necessary for a nation to uplift its standards of teaching, research and practices in science, engineering and technology guided by ethical and moral principles and regulations of arts. Mathematics being at the interface of arts and sciences is the tool of tools upon which the entire structure of scientific knowledge is established. Hence, a firm foundation for our graduates in mathematics becomes a pre-requisite for efficient progress in other quantitative and highly technical fields.

With a blend of courses of both pure and applied nature in the undergraduate program, the students acquire knowledge in theories, systematization and justification of discipline of mathematics in the investigation of problems of real life.

The graduate program exposes students to cutting-edge research in mathematical sciences by teaching them a series of courses, making them participate in seminars and involving them in research activities.

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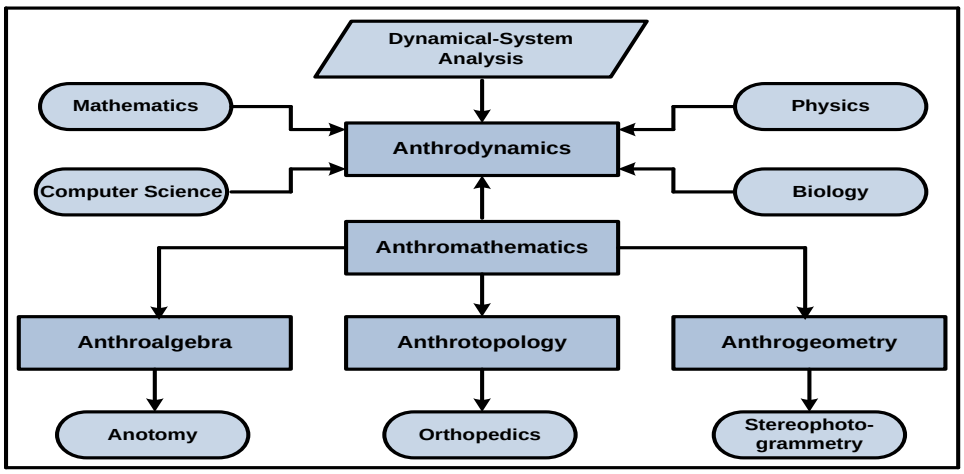

Research

The strategy of knowledge of the problem at hand and knowledge of the associated fields is being used to bring out efficient, elegant and innovative solutions to problems challenging the mankind in the third millennium, using the techniques of mathematics. System, environment and sources-of-error modeling using tools of mathematics, fine-tuning done through simulations and test runs, followed by validation through field trials are the protocols of applied-mathematics research.

ANTHROMATHEMATICS: MATHEMATICS OF THE THIRD MILLENNIUM

Anthromathematics is the mathematics of human body sizes, forms, proportions and structures. The term was first used on March 22, 2010 in **the Syed Firdous Memorial Lecture on Mathematics in the Life Sciences** (http://www.ngds-ku.org/presentations/Firdous.pdf), delivered by Professor Dr. Syed Arif Kamal, during the First Conference on Mathematical Sciences, as part of the Golden Jubilee Celebration of Department of Mathematics, UOK. *Anthropology*, study of human being, and *anthropometry*, measurement of human being, are evolved and enriched through new ideas from chemistry, engineering, health and safety, physics and, above all, mathematics. To elaborate the point further, an *anthropometrist* is supposed to take heights, but an *anthromathematician*, not only, must measure heights, but also, determine accuracy, precision and reproducibility of the techniques used, while planning the session, subsequently, aligning the scale at the same time ascertaining that the surface is level and checking the equipment against agreed-upon standards at the start of each session and, finally, estimating consistency of collected data at the end of every session.

THE FIRST CONFERENCE ON ANTHROMATHEMATICS
IN THE MEMORY OF (LATE) SYED FIRDOUS

http://www.ngds-ku.org/Anthromathematics/2013/Anthromathemaics2013.pdf

The First Conference was held in collaboration with Government College, Hyderabad (GCH). It was dedicated to the memory of our loving colleague, (Late) Syed Firdous, who was born on September 4, 1952 in Jacobabad, Sindh and educated at University of Sindh, the affiliating institution of Government College, Hyderabad. He visited the college during one of the Annual Functions of the Alumni Association. At the time

of his death he was serving as Associate Professor and Head, Department of Mathematics, SM Government Science College, Karachi as well as Member, Board of Studies, Department of Mathematics, UOK. He was associated with the NGDS Pilot Project (http://ngds.uok.edu.pk) from its inception in 1998 to his death on June 21, 2008. The late educationalist was involved in planning, implementation, community outreach, data collection (himself measured over 2000 children on the school premises), modeling and analysis involving measurements of heights, weights and mid-upper-circumferences (MUAC) of primary-school children. His dedication to research resulted in co-authorship of 10 papers with Conference Chairman. Department of Mathematics, University of Karachi honored him by naming Growth-and-Imaging Laboratory after him and arranging his memorial lecture during *the First National Conference on Mathe-*

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Conference Chair delivering the Syed Firdous Memorial Lecture on Monday, March 22, 2010, in which the word 'Anthromathematics' was used for the first time

matical Sciences (2010). The two-day First Conference started on Wednesday, September 4, 2013, **the sixty-first birth anniversary of (Late) Syed Firdous**. It consisted of technical sessions on mathematics interfacing with anatomy and physiology of the human body. A pre-conference workshop on anthropometric measurements of children was arranged for those dealing with normal and special children. On the second day of the conference **the Syed Firdous Memorial Lecture** was delivered (http://www.ngds-ku.org/Presentations/Scan.pdf).

Patron
Prof. Dr. Muhammed Qaiser, Honorable Vice Chancellor, University of Karachi (UOK)

Conference Chair
Prof. Dr. Syed Arif Kamal (http://ngds.uok.edu.pk/kamal), PhD, Mathematical Neuroscience; MA, Johns Hopkins, Baltimore, MD, USA; Project Director, the NGDS Pilot Project (http://ngds.uok.edu.pk); Head, Anthromathematics Group (http://anthromath.uok.edu.pk); Convener, Program in Anthromathematics and Sport Mathematics, Chairman, Department of Mathematics (http:///math.uok.edu.pk), University of Karachi (http://www.uok.edu.pk); Member, Subject Committee for Physical Education, Health and Sport Sciences, National Testing Service (http://www.nts.org.pk), Pakistan; Guest Speaker, Harvard Medical School (http://hms.harvard.edu), Boston, USA; Sessional Faculty, the Aga Khan University Medical College (http://aku.edu); Associated Faculty, Malmö General Hospital, Sweden; Visiting Faculty, the Albert Einstein College of Medicine (https://www.einstein.yu.edu), New York, USA; Research Associate, James W. Riley Hospital for Children, Indianapolis, USA); e-mail**:** sakamal(at the rate of)uok.edu.pk; Telephones**:** +92 21 9926 1300-6 ext. 2380, 2293

Conference Co-Chair
Prof. M. Khalid Rajput, Professor of Physics and Principal, Government College, Hyderabad;

ANTHROMATHEMATICS 2015
The Third Conference on Anthromathematics and Sport Mathematics
Department of Mathematics, University of Karachi
and Government College, Hyderabad
Wednesday and Thursday, September 2 and 3, 2015
*Extended Abstract Submission***: Sunday, June 21, 2015** (seventh death anniversary of Syed Firdous)
(550-600 words with zero figure; 400-450 words with up to 2 figures; Times New Roman Font 10)
*Registration Form***:** http://www.ngds-ku.org/Anthromathematics/2015/Registration_Form2015.pdf
*Final Program***: Monday, August 3, 2015**

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Vice Chancellor, University of Sindh inaugurating the First Conference on Anthromathematics in Assembly Hall, Government College, Hyderabad on Thursday, September 5, 2013

Organizing Committee
Prof. Dr. Ghazala Hafiz Rizwani, (Senior-Most) Dean, Faculty of Pharmacy, UOK
Prof. Dr. Shagufta Shahzadi, Dean, Faculty of Education, UOK
Prof. Dr. Abid Azhar, Dean, Faculty of Science, UOK
Prof. Dr. Ansisuddin Bhatti, Ex-Director, JPMC
Prof. Dr. Tehseen Rahim, Chairman, Department of Physics, UOK
Prof. Dr. Nasiruddin Khan, Department of Mathematics, UOK
Prof. Dr. Abdulbasit Shaikh, Department of Computer Science, FUUAST
Dr. Basit Ansari, Incharge, Department of Health, Physical Education and Sports Sciences, UOK
Mr. M. Wasim, Department of Computer Science, UIT
Mr. Shahid, Department of Mathematics, UOK
Mr. Maqsood Sarwar, Department of Mathematics, UOK

Conference Secretary
Mr. Asif Masood, Dept. of Mathematics, UOK
Cell**:** +92 300 821 1089

Registration Form
http://www.ngds-ku.org/Anthromathematics/2014/Registration_Form2014.pdf

Abstract Booklet
http://www.ngds-ku.org/Anthromathematics/2014/Abstracts2014.pdf

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Program (Thursday, September 4, 2014)

Venue	Assembly Hall, Government College (GCH), Hyderabad
0830h-0910h	Registration of participants
Registration	PDF File**:** http://www.ngds-ku.org/Anthromathematics/2014/Registration_Form2014.pdf
Form	Word File**:** http://www.ngds-ku.org/Anthromathematics/2014/Registration_Form2014.doc
0910h-1150h	**ANTHRO14-I: Inaugural Session**
Compèring	Prof. Salim Mughal (Dept. of Botany, GCH)
0910h-0920h	Tilawat and Translation
	by Dr. M. Mujeebullah Mansoori (Dept. of Islamic Studies, GCH) — Al-Quran 23**:** 12-14
0920h-0925h	National Anthem
0925h-0940h	Presentation of *Ajraks* and Bouquets to the Guests
0940h-0950h	Welcome Address by Prof. M. Khalid Rajput (Principal, GCH)
0950h-1015h	Address by Guest of Honor, Prof. Dr. Abdur Rasool Abbasi
	(Dean, Faculty of Natural Sciences, SU)
1015h-1030h	Address by Chief Guest, Honorable Prof. Dr. M. Aslam Uqaili (Vice Chancellor, MUET)
1030h-1145h	Anthro14-01**:** *The Evolution of Anthromathematics (2010-2014)*
Page 5	The Hussain Ahmed Bilgirami Memorial Lecture by Conference Chair, Prof. Dr. Syed Arif Kamal (Almnus, GCH, 1971-1973; Member, Executive Committee, Karachi Chapter, Alumni Association, GCH, 2013-2015, Chairman, Dept. of Mathematics, UOK) — Co-authors**:** Samira S. Jamil, Urooj A. Razzaq
*Abstract**:**	http://www.ngds-ku.org/Presentations/Anthromathematics2010-4.pdf
1145h-1150h	Vote of Thanks by Prof. M. Idrees Khan
1150h-1200h	*Tea*
1200h-1400h	**ANTRO14-II: Technical Session**
Session Chair	Prof. Dr. Muhammed Salim Chandio (Director, Institute of Mathematics & Technology, SU)
and Co-Chair	Prof. Dr. Ahsanullah Baloch (Faculty of Engineering Sciences, ISRA University, Hyderabad)
1200h-1230h	Anthro14-02**:** *A Security-cum-Background-Rating System through Face Recognition employing*
Page 6	*Edge-Based Rasterstereography*
	Invited Lecture by Mr. M. Wasim (Dept. of Computer Science, Usman Institute of Technology, Karachi) — Co-author**:** S. Arif Kamal
*Abstract***:**	http://www.ngds-ku.org/Presentations/Rating.pdf
1230h-1245h	Anthro14-03**:** *Gait Analysis of 7-10-Year-Old Children to Investigate Correlation between*
Page 7	*Spastic Gait and Hip Weakness*
	Opening Talk by Conference Co-Chair — Co-author**:** S. Arif Kamal, Samira S. Jamil
*Abstract***:**	http://www.ngds-ku.org/Presentations/Spastic.pdf
1245h-1300h	Anthro14-04**:** *Crystal-Structure-Concept-Based Modeling of the Human Spinal Column*
Page 8	*Validated through 3-D-Bone Scanning* by Mr. Maqsood Sarwar (Dept. of Mathematics, UOK) — Co-authors**:** S. Arif Kamal, M. Khalid Rajput
*Abstract***:**	http://www.ngds-ku.org/Presentations/Spinal.pdf
1300h-1315h	Anthro14-05**:** *A Calibration Device for Moiré-Fringe-Topographic System*
Page 9	by Mr. Shakeel Ahmed Ansari (Dept. of Physics, UOK) — Co-author**:** S. Arif Kamal
*Abstract***:**	http://www.ngds-ku.org/Presentations/Device.pdf
1315h-1330h	Anthro14-06**:** *Growth-and-Obesity Enhanced-Roadmaps of Children*
Page 10	Concluding Talk by Conference Chair — Co-authors**:** Shakeel A. Ansari, Samira S. Jamil
*Abstract***:**	http://www.ngds-ku.org/Presentations/Enhanced.pdf
1330h-1345h	Discussion
1345h-1355h	Concluding Remarks by the Session Chair, Prof. Dr. M. Salim Chandio
1355h-1400h	Closing and Recommendations of the Conference by Conference Secretary, Mr. Asif Masood
Page 11	(Dept. of Mathematics, UOK)
1400h-1500h	*Lunch and Zuhr Prayers*

Social Program

1500h-1600h	**Outing at Bank of Indus River — Hotel Al-Manzar**

*Link on homepage of Conference Chair

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Outing at Bank of Indus River — Hotel Al-Manzar on Thursday, September 5, 2013

Anthromathematics Group

As per recommendations of the First Conference, Anthrmathematics Group has been established in Department of Mathematics. It has an official web page http://anthromath.uok.edu.pk. The group is involved in research on modeling of human spinal column (3-D static and dynamic models), human brain (covariant, generalized coupling, covariant-generalized coupling), human heart (system of standing waves) as well as application of 3-D-optical imaging techniques (moiré fringe topography, rastersteography and dotted rasterstereography, raster stereophotogrammtery) to face recognition, detection, documentation, quantification and follow-up of trunk deformities, in particular, scoliosis, anthropometry and somatotyping. Notable concepts introduced are mathematical definition of brain death identified with negative exponential of the solution (http://www.ngds-ku.org/Papers/J14.pdf), Asr angle determination from moiré topograph (http://www.ngds-ku.org/Papers/J22.pdf) — 3-D generalization of Cobb angle, degree of correction of spinal deformity (http://www.ngds-ku.org/Papers/J23.pdf), heart as a deformed ellipsoid of revolution (http://www.ngds-ku.org/Papers/J25.pdf), simultaneous moiré and raster recording and information separation through selective filtering (http://www.ngds-ku.org/Papers/J16.pdf), edge-based moiré (http://www.ngds-ku.org/Papers/J17.pdf), edge-based raster (http://www.ngds-ku.org/Papers/C68.pdf), bone scanning (http://www.ngds-ku.org/Presentations/Backscatter.pdf) using backscatter-X-ray-moiré and backscatter-X-ray-raster as well as generation of raster grid from moiré grid and vice versa (http://www.ngds-ku.org/Presentations/Anthroimaging.pdf). The most active area of research is child anthropometry combined with modeling of child growth and obesity. Key concepts put forward are quantitative estimates of obesity/wasting (taking optimal mass as reference) and stunting/tallness (taking current-age-mid-parental height as reference) expressed as percentages (http://www.ngds-ku.org/Papers/J29.pdf), estimated-adult BMI (http://www.ngds-ku.org/Papers/J30.pdf), optimal mass as the mass corresponding to percentile of height (http://www.ngds-ku.org/Presentations/Optimal_Weight.pdf), energy-channelization problem, pseudo-gain of height or mass (http://www.ngds-ku.org/Papers/J32.pdf) and 6-month quantitative recommendations to reduce masses for obese children (http://www.ngds-ku.org/Presentations/Roadmap.pdf). Data-based examples of each of the above concepts have been complied in the file**:**

http://www.ngds-ku.org/Presentations/Sport_Mathematics/Additional_File.pdf

MSc **Sport Mathematics** ***Anthrotopology and Gymnnastic-Performance Analysis***	**MSc** **Anthromathematics** ***Algebraic Topology and Orthopedics***
MPhil **Anthromathematics and Sport Mathematics** ***Advanced Anthromathematics***	**PhD** **Anthromathematics and Sport Mathematics** ***Topics in Sport Mathematics***

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USEFUL INFORMATION (about Department of Mathematics)

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Mr. Wasim Ahmed Ansari
Mr. Shahid Sultan Ali
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Special Project
The NGDS Pilot Project
http://ngds.uok.edu.pk

*How to reach Department of Mathematics***:**
(includes link to map)*
http://www.ngds-ku.org/kamal/contact.htm#Directions

Program in Anthromathematics and Sport Mathematics
Anthromathematics Group
http://anthromath.uok.edu.pk

Paper Mail
Office of Department of Mathematics, Room 005, Mathematics Building, University of Karachi, University Road, Karachi 75270, Pakistan.

Mathematics Resources
National-Curriculum-Revision Committee for Mathematics, Higher Education Commission**:**
Curricula for BS, MS and PhD in Mathematics
http://www.ngds-ku.org/HEC/ncrc.htm
Subject Committee for Mathematics, National Testing Service Pakistan**:**
Curriculum for GAT (Subject**:** Mathematics)
http://www.ngds-ku.org/NTS/NTS_Math_Curriculum.pdf
Mathematics-Teacher-Interview Format
http://www.ngds-ku.org/math/Math_Job.pdf

*Copy and paste the link, which follows, into the browser window.

*Web address of this document***:**
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