



University of Karachi
Department of Mathematics

Session 2014

Pre-requisite: MATH 609

MATH 610: Biomathematics II (2+1)

Activity	Dates	Class Schedule
Teaching	August 4 – November 28	Thu M 1420h-1600h, E 1800-1940h
Critical Review	September 22 – October 31	Fri M 1020h-1200h, E 1800-1940h
Semester Examinations	December 2-19	Venue: Room No. 124, Mathematics
Vacations	December 20–31 (Winter)	Office Hours: Mon-Wed 1530h–1630h

Course Supervisor: **Prof. Dr. Syed Arif Kamal**
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Course Objectives

To give the students a sound background in the techniques & the methods of biomathematics so that they can apply these ideas to improve health of self and family, work closely with doctors and allied-health professionals and enter graduate programs in anthromathematics

Higher Education and Job Opportunities

MS/MPhil/PhD from Karachi University, IBA, LUMS, Urdu University, the Aga Khan University and DUHS; jobs in health-care sector, R&D organizations, colleges and universities. This course would be a plus point for job in schools and hospitals, because the students get hands-on training in anthropometry.

Course Outline

Section A: Anatomy of the spinal column, evaluation of posture and gait, spinal/trunk deformities (scoliosis, kyphosis and lordosis), Cobb and Ferguson angles,

examination techniques

Section B: 3-D optical imaging and image processing—moiré fringe topography, rasterstereography, simultaneous recording, edge-based moiré, edge-based raster: biomedical applications (posture and gait analysis, detection, documentation and quantification of spinal deformities, face recognition and security technologies)

Section C: 3-D static and dynamic modeling of the human spinal column

Section D: Heart sounds (A, P, T, M), Modeling of the heart function, cardiac coördinates (mathematical treatment)

Section E: Wright and Kydd, covariant, generalized-coupling and covariant-generalized-coupling models, group-theoretical treatment, mathematical definition of brain death



MATH 610: Course Plan

Date	THURSDAY	Date	FRIDAY
AUGUST			
14	Anatomy of the spinal column (cervical, thoracic, lumbar and sacral regions), evaluation of posture		
21	Spinal deformities (scoliosis—juvenile and idiopathic, kyphosis, lordosis, hump back and flat back)		
28	Cobb and Ferguson methods of measuring a scoliotic spine: strengths and weaknesses		
SEPTEMBER			
04	ANTHROMATHEICS 2014	05	No Class (rest after the conference)
11	Examination techniques for scoliosis detection	12	3-D optical imaging: biomedical applications I
18	3-D optical imaging: biomedical applications II	19	3-D biomedical image processing I
25	3-D biomedical image processing II	26	Introduction to modeling of the spinal column
OCTOBER			
02	Transformation theory I	03	Transformation theory II
09	3-D static model of human spinal column	10	Gait analysis
16	3-D dynamic model of human spinal column	17	No Class (preparation for critical review)
23	Modeling of heart function	24	Auscultation of heart/stethoscope
30	Physiology of brain	31	Mathematics of driven harmonic oscillators
NOVEMBER			
06	Modeling of human brain	07	Group-theoretical treatment/brain death
13	Ashura Holliday	14	Ashura Holliday
20	Model Paper Solution	21	Final Review/Exam-Taking Strategy

MATH 610: Marks Breakdown

Evaluation Parameter	Marks
Terminal	80
Critical Review (Laboratory)	20
Total	100