



University of Karachi

Department of Mathematics

Program in Industrial & Business Mathematics

Degree Offered

MSc (Industrial & Business Mathematics), abbreviated as MIBM

Monday – Saturday (1700h –2100h)

Contact Persons

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Aims and Objectives

Aims and objectives of Program in Industrial and Business Mathematics (PIBM) may be summarized as:

- Equip students with mathematical tools required in industry
- Train students in mathematical techniques, applied in the business and the financial sector
- Develop ability in students to formulate a problem using the language of mathematics
- Propose mathematical solutions to indigenous problems arising in the industrial, the business and the financial sector
- Inculcate habits of creative thinking and critical analysis in students
- Strengthen academia-professional world bonding by tailoring the courses and the training offered according to needs of the end user

Program Description

In the modern era of knowledge-based economy, it is absolutely necessary for a nation to uplift its standards of teaching, research and practice in science, technology and engineering. Mathematics is one of the critical pillars, upon which the entire structure of scientific knowledge is established. Hence, a long foundation for our graduates in mathematics is a pre-requisite for efficient progress in other quantitative and highly-technical fields.

PIBM is a highly application-oriented and job-focused scheme of studies in mathematical sciences. Such a program was launched for the first time in Pakistan in 1995 by University of Karachi. Current Chairman, Department of Mathematics was involved in the planning and the development of this program from the day of its inception. It offers training as well as training tools to a broad community of users in science, Industry, business, finance, health-care and social sciences. It is, also, of special utility to R&D planners and practitioners as well as quality-control managers. It stresses, among other things, project development, professional seminars, internships, as also coverage of more pragmatic recent advances in mathematics.

In the core mathematics part of studies the students acquire knowledge in theories, which constitute the scientific foundation of development, systematization and justification of mathematical discipline in the investigation of real-life problems. This part is general enough to cope with future trends of mathematics.



The applied courses taught include stochastic processes, econometrics, optimization and financial engineering, modeling and time-series forecasting, simulation techniques, dynamical-system analysis, optimal control and MIS, actuarial mathematics, game theory and applications, fuzzy sets and applications as well as biomathematics.

Faculty

Highly-qualified faculty with degrees from reputed universities in USA, France, England, Canada and Germany, *e. g.*, the Johns Hopkins University (USA), University of Cambridge (England), teaches PIBM courses according to the modern trends based on problem solving, applications and hands-on training. Many of them are on the list of HEC-Approved PhD Supervisors. Our faculty is, actively, involved in research, administration and professional development. Our faculty, regularly, produces research papers and acts as referees and editors of research journals. Some have, also, received research-productivity allowance from Pakistan Science Foundation.

Course Listing

<i>Semester I</i>		<i>Semester II</i>	
Course No.	Course Title	Course No.	Course Title
PIBM 501	Discrete/Finite Mathematics I	PIBM 524	Discrete/Finite Mathematics II
PIBM 505	Applied Mathematical Analysis I	PIBM 528	Applied Mathematical Analysis II
PIBM 509	Applicable Physical Mathematics	PIBM 532	Dynamical-System Analysis
PIBM 513	Nonlinear/Global Analysis I	PIBM 536	Nonlinear/Global Analysis II
PIBM 517	Probability & Statistical Analysis I	PIBM 540	Probability & Statistical Analysis II
PIBM 521	Data Structures & Programming Languages I	PIBM 544	Data Structures & Programming Languages II
<i>Semester III</i>		<i>Semester IV</i>	
Course No.	Course Title	Course No.	Course Title
PIBM 601	Numerical Computing & Applications Software I	PIBM 620	Numerical Computing & Applications Software II
PIBM 605	Stochastic Processes	PIBM 624	Modeling & Time-Series Forecasting
PIBM 609	Mathematical Ecology	PIBM 628	Simulation Techniques
PIBM 613	Econometrics	PIBM 632	Optimal Control & MIS
PIBM 617	Optimization & Financial Engineering Optional I	PIBM 636	Actuarial Mathematics Optional II
<i>Optional Courses: Semester III</i>		<i>Optional Courses: Semester IV</i>	
Course No.	Course Title	Course No.	Course Title
PIBM 621	Fractal Modeling	PIBM 640	Fuzzy Sets & Applications
PIBM 625	Game Theory & Applications	PIBM 644	Information Theory & Cybernetics
PIBM 629	AI Techniques & Applications	PIBM 648	Biomathematics



Professional Exposure

Department of Mathematics has established liaisons with multinationals and government organizations, e. g., Engro Asahi Chemicals and Polymers (Ltd.), the Aga Khan Foundation, Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), Data Communications and Controls, etc. The multinationals conduct training-need assessment (TNA) for our students as well as offer specialized training, internships and, eventually, jobs to our graduating students.

The (weekly) MIBM-Seminar Series exposes students to current trends in mathematics as well training in presentation skills, job-searching skills, interviewing skills and handling industrial projects.

Department of Mathematics

Department of Mathematics was established in 1956. Professor Dr. Suleman Kerawala was the Founder Chairman. Professor Dr. S. M. Yahya introduced course reforms, and Professor Dr. Jawaid Quamar launched PIBM. Professor Dr. Nasiruddin Khan initiated IT Program. Presently, he is Academic Advisor (departmental) and Convener, IT Program.

Current Chairman, Professor Dr. Syed Arif Kamal, assumed his term on September 16, 2003. During the last semester 4 seminar series were running on a weekly basis (speaker's introduction and abstract of talk available on website). In addition, faculty of the Department presented papers in the World Climatic Change Conference, Moscow (Oct 2003), the World Conference on Mathematics (March 2004) and National Australian Convention of Amateur Astronomers, Hobart, Australia (April 2004). Department of Mathematics is, also, a bidder for the proposed National Center for Mathematics.

Faculty is engaged in research in algebra, operations research, fluid dynamics, relativity and gravitation, quantum mechanics, electrodynamics, climatology, astrodynamics, biomathematics and bioinformatics, 3-D optical imaging and image processing, controls and simulation as well as pedagogical techniques in mathematics.

As part of its Community-Outreach Program, department is offering the Early Talent Research Participation Program (ETRPP) and internships to pre-university students.

Department of Mathematics is, currently, short of space. Classrooms are cramped and faculty members have to share offices. If the proposed Mathematics-Research Facility Wing is approved, the Department shall have additional space for faculty offices, laboratories, seminar library and discussion rooms.

Programs Offered

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| a) Post-Doctoral Program | b) DSc |
| c) PhD | d) MPhil |
| e) MA/MSc (Pure Mathematics) | f) MA/MSc (Applied Mathematics) |
| g) MIBM (Evening Program) | h) BA/BSc (Honors) |
| i) Diploma in Mathematics
(Evening Program) | j) Certificate in Mathematics
(Evening Program) |

Students, who did not have Mathematics in BA/BSc could enroll in this program to fulfill eligibility requirements for MA/MSc in Pure & Applied Mathematics as well as MIBM

Students, who did not have Mathematics in HSC could enroll in this program to fulfill eligibility requirements for BSc (Honors) in Mathematics, BS in Computer Science, etc.

In addition to these core programs, Department caters to the subsidiary courses in Mathematics offered in 14 combinations of BSc (Honors) and all combinations of BA (Honors). The Department, also, renders the services of its full-time faculty to teach mathematics courses in other programs and departments.



Future Directions

In June of this year our faculty shall be presenting papers in the International Bhurban Conference on Applied Sciences and Technologies. In addition, the Department intends to hold National Conferences on Trends in Mathematics and Cutting-Edge Technologies. Refresher courses and trainings are to be arranged for college teachers. As part of its Community-Outreach Program, the Department is planning to hold Teachers-Training Workshops for pre-university mathematics and science teachers, develop Pre-University Integrated Mathematics & Science Curriculum as well as initiate Cyber Science Society, to discover and to groom talent in far-fetched areas of the country.

Department of Mathematics intends to launch 4-year BS Program (Financial Mathematics), already approved from all academic bodies, from the next session. In addition, MSc (Applied Mathematics), which is offered in the morning program, shall, also, be announced in the evening program.

University of Karachi

University of Karachi, largest in the country in terms of student enrolment and number of PhD's produced, is located in the heart of Karachi, the financial and the business center of Pakistan. The University 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, University of Karachi is rated as the best public-sector university in the country. With a campus spanning over 1200 acres the university offers a breathtaking view and pollution-free environment if one wants to get away from smog of the city.

Website: <http://www.uok.edu.pk>

On the next page is program of MIBM Grand Seminar.



University of Karachi

Department of Mathematics

Industrial & Business Mathematics in the Third Millennium

MIBM Grand Seminar

Monday, May 17, 2004

Venue: Arts Auditorium, University of Karachi

Program

	Comparing	Muhammad Jawed Iqbal Assistant Professor <i>Department of Mathematics, University of Karachi</i>
1710h	<i>Seminar starts</i>	
1711h	Recitation of Holy Quran	Muhammad Imtiaz Coöperative Teacher <i>Department of Mathematics, University of Karachi</i>
1715h	Mathematics in Finance & Economics	Ahmad Raza Mathematical Tripos <i>University of Cambridge</i>
1725h	Mathematics of Pricing Theory	Ahsanuddin Lecturer <i>Department of Economics, University of Karachi</i>
1735h	Industry-University Linkage	Engineer Nayyar Iqbal Raza Technical Manager <i>Engro Asahi Polymer & Chemicals (Ltd.)</i>
1745h	Mathematical Applications in Robotics	Engineer Sameer Hoodbhoy Managing Director <i>Data Communications & Controls (Ltd.)</i>
1755h	Operations Research: A Mathematical Tool	Professor Dr. Nasiruddin Khan Professor and Academic Advisor <i>Department of Mathematics, University of Karachi</i>
1805h	Concluding Talk	Professor Dr. Syed Arif Kamal Professor and Chairman <i>Department of Mathematics, University of Karachi</i>
1815h	Discussion	Moderated by Chairman
1827h	Vote of Thanks	Muhammad Rafi Abbasi MIBM Student <i>Department of Mathematics, University of Karachi</i>
1830h	<i>Seminar ends</i>	
1835h	Refreshments	Faculty Club, Department of Mathematics