

# SBASSE GRADUATE PROGRAMMES



**LUMS**

**SYED BABAR ALI SCHOOL OF SCIENCE AND ENGINEERING  
(SBASSE)**

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## Message from the Dean

Syed Babar Ali School of Science and Engineering (SBASSE) at LUMS is the first private research school of Science and Engineering in Pakistan. It has consciously modelled itself along the lines of the world's top research schools and has a highly qualified faculty to accomplish its mission. The hallmark of SBASSE is its no boundaries philosophy, which encourages cross-disciplinary collaborations not only between various disciplines at SBASSE but also those offered by other Schools at LUMS.

Our multifaceted 21<sup>st</sup> century curriculum provides the students of SBASSE adequate breadth and depth in their education and positions them to pursue rapidly evolving areas that interface with other disciplines. The fact that our graduates are much sought after by leading academic institutions as well as organisations in the Engineering and IT sector every year serves as a solid indicator of the high quality of our programmes.

With our resolute vision, excellent research-active faculty, outstanding students and modern infrastructure that includes state-of-the-art classrooms and laboratories, SBASSE is poised to become a globally competitive leader in Science and Engineering research and education.

**Dr. Shahid Masud, Dean  
Syed Babar Ali School of Science  
and Engineering**

## LUMS

The Lahore University of Management Sciences is one of Pakistan's leading universities that is regularly rated among the top universities in Asia. It is one of the top degree awarding institutions in the region with a strong aim to advance education in a broad range of disciplines including Business Management, Law, Education and selected areas of Science

and Engineering, Humanities, Social Sciences and Economics. The faculty at LUMS includes 194 PhDs from some of the world's finest institutions including University of Cambridge, University of Oxford, Massachusetts Institute of Technology, University of California at Berkeley, Georgia-Tech, Harvard University and Stanford University.

## SYED BABAR ALI SCHOOL OF SCIENCE AND ENGINEERING

Launched in 2008, the Syed Babar Ali School of Science and Engineering (SBASSE) at LUMS is a pioneering private research school in Pakistan, that imparts top quality education in Science and Engineering with a vision to carry out world-class, multidisciplinary education and research.

Currently, SBASSE offers undergraduate, graduate and doctoral degrees in six disciplines: Biology, Chemistry, Computer Science, Electrical Engineering, Mathematics and Physics.



# The MS and PhD Programmes

## MS

The MS programmes at SBASSE are rigorous and designed to impart specialised professional and research oriented training to students. The School offers MS programmes in Biology, Chemistry, Computer Science, Electrical Engineering, Physics and Mathematics. To graduate, students must accumulate a total of 30 credit hours either entirely from coursework, or by collecting 24 credit hours from coursework and the rest from a thesis. Hence, all SBASSE departments offer two options to choose from: 'MS-by-coursework' or MS-by-thesis'. The standard duration for completing the MS degree is 2 years.

During the course of study, students learning takes place through lectures, tutorials, laboratories, problem-solving exercises, research projects and frequent interaction with experienced world-class faculty members.

## PhD

The SBASSE PhD programmes prepare students to think scientifically and conduct high quality research independently. The School offers PhD programmes in six disciplines: Biology, Chemistry, Computer Science, Electrical Engineering, Mathematics and Physics. Students entering the PhD programmes must have an MS or an MPhil degree. To graduate, students must earn a total of 42 credit hours from which 18 must be from coursework and 24 from research work/thesis. Major milestones that must be achieved for the successful completion of the PhD degree include the Comprehensive (Qualifying) Examination, Thesis Proposal Defense and PhD Thesis Defense. In compliance with the policies of the Higher Education Commission (HEC) of Pakistan, all admitted students must clear the GRE Subject or HEC recommended NTS test and obtain a score of 60<sup>th</sup> percentile or above. This requirement must be fulfilled by the end of the first calendar year after admission. Students have 4 years to complete the graduation requirements. All PhD students admitted to SBASSE are provided a full tuition fee waiver and a monthly stipend to cover their living expenses. Continuation of financial support is dependent on satisfactory academic performance.

# WHY JOIN SBASSE?

1

## BEYOND SBASSE

TOP ACADEMIC PLACEMENTS AT INSTITUTES SUCH AS



OUR GRADUATES ARE HIRED BY TOP LOCAL AND INTERNATIONAL ORGANISATIONS SUCH AS



**20%** OF THE GRADUATES GO FOR HIGHER STUDIES

**60%** OF OUR GRADUATES HAVE BEEN PLACED ON JOBS WITHIN THE FIRST YEAR OF GRADUATION

**93%** OF THE GRADUATES RECEIVE FULLY FUNDED SCHOLARSHIPS AT TOP UNIVERSITIES

2

## TOP QUALITY PUBLICATIONS

THE RESEARCH CONDUCTED BY THE GRADUATE STUDENTS AT SBASSE HAVE BEEN PUBLISHED IN RENOWNED, TOP-QUALITY JOURNALS LIKE:

- JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS
- IEEE/ACM TRANSACTIONS ON NETWORKING
- ARTIFICIAL INTELLIGENCE REVIEW
- PHOTONICS AND NANOSTRUCTURES: FUNDAMENTALS AND APPLICATIONS
- ORGANIC LETTERS
- THE JOURNAL OF BIOLOGICAL MACROMOLECULES
- NATURE
- ROYAL SOCIETY OF CHEMISTRY
- JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS

3

## COLLABORATIONS WITH NATIONAL AND INTERNATIONAL EDUCATIONAL INSTITUTES



INSTITUTE OF ELECTRONICS AND TELECOMMUNICATION OF RENNES (IETR) RESEARCH LABORATORY AT RENNES FRANCE



RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY



SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN (SUTD), SINGAPORE



TEXAS A&M UNIVERSITY, QATAR



INTERNATIONAL COMPUTER SCIENCE INSTITUTE, UC BERKELEY



RWTH AACHEN UNIVERSITY, GERMANY

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## INTERDISCIPLINARY PROGRAMMES



THE RIGOROUS SBASSE GRADUATE PROGRAMME CURRICULUM PROVIDES A **MULTIDISCIPLINARY LEARNING ENVIRONMENT**. IT PROVIDES STUDENTS AN OPPORTUNITY TO WORK WITH KNOWLEDGE DRAWN FROM **ALL 6 DISCIPLINES** BEING OFFERED AT SBASSE AS A PART OF THE FREE ELECTIVE REQUIREMENT.

5

## WORLD-CLASS FACULTY

**80+** HIGHLY QUALIFIED FACULTY MEMBERS

**75+** PhD FACULTY MEMBERS

**WORLD-RENOWNED** ACADEMICIANS

6

## GLOBAL EXPOSURE THROUGH INTERNATIONAL EXCHANGE PROGRAMME



MS AND PhD PROGRAMME STUDENTS AT SBASSE PARTICIPATE IN **VARIOUS EXCHANGE PROGRAMMES** AND **RESEARCH OPPORTUNITIES** SPONSORED BY NATIONAL ICT R&D FUND, HEC, COMMONWEALTH, ERASMUS-MUNDUS AND DAAD

7

## 24 HOUR ACCESS TO VIRTUAL LEARNING

**WI-FI** ACCESS ACROSS THE CAMPUS

**180,000** E-BOOKS AVAILABLE IN THE LIBRARY

OFF-CAMPUS ACCESS TO OVER **36,000** FULL-TEXT ONLINE JOURNALS

8

## GENEROUS FINANCIAL SUPPORT

**MERIT SCHOLARSHIPS**

**FULLY FUNDED** PhDs

**TUITION FEE WAIVER** FOR DESERVING MS BASIC SCIENCE STUDENTS

**RA/TA POSITIONS** FOR GRADUATES (IF AVAILABLE)

**HEC RESEARCH GRANTS** FOR PhD STUDENTS (IF AVAILABLE)

# Department of Biology

The Department of Biology at SBASSE offers MS and PhD programmes with specialisations in Molecular Biology and Bioinformatics. State-of-the-art research laboratories, experienced faculty along with a collaborative environment with a strong focus on research in areas like Cancer Cell Signalling, Plant Immunity, Structural Biology related to Viruses, Bacterial Pathogenesis and Diabetes, Epigenetic, Genome Evolution, Bioinformatics, and Virology, contribute to the programme's competitive edge. The lectures and tutorials are complimented with experiments and project work in laboratories.

## DID YOU KNOW?



*Specialised laboratories have established Arabidopsis, fruit flies, mammalian cells as a model system*



*Dedicated HPC facility for high performance computing (HPC) housed within the Bioinformatics Research Laboratory*



*Our laboratories have state-of-the-art facilities and equipment*

## FACULTY

The Department of Biology is led by the following members of faculty who are accomplished and experienced in their respective areas of expertise. Guest faculty members are constantly sought to further strengthen and expand the department's research programmes.

- **Dr. Amir Faisal** (PhD, Friedrich Miescher Institute for Biomedical Research, Switzerland)
- **Dr. Aziz Mithani** (DPhil, University of Oxford, UK)
- **Dr. Safee Ullah Chaudhary** (PhD, Korea Advanced Institute of Science and Technology (KAIST), South Korea)
- **Dr. Syed Shahzad ul Hussan** (PhD, University of Lubeck, Germany)
- **Dr. Ahmed Jawaad Afzal** (PhD, Southern Illinois University, USA)
- **Dr. Muhammad Tariq** (PhD, Friedrich Miescher Institute for Biomedical Research, Switzerland)
- **Dr. Shaper Mirza** (PhD, University of Alabama at Birmingham, USA)
- **Dr. Syeda Kahkeshan Hijazi** (PhD, Boston University, USA)

## RESEARCH FACILITIES

Students can benefit from the following research facilities at the Department of Biology:

- State-of-the-art equipment including confocal microscope, fluorescence activated cell sorter (FACS), fast protein liquid chromatography, MiSeq next generation sequencer, conventional and real time thermo cyclers, ultrasonic bioruptor, gel documentation systems, high-speed centrifuges and tissue culture rooms
- Access to 600 MHz NMR
- HPC nodes as well as General Purpose Graphical Processing Units (GPGPU) including NVIDIA's Grid K2 and Tesla K40C
- Several in-house software tools available online to leverage the laboratories GPGPUs and HPCs

If you need more information on any of these programmes and research being conducted at the Department of Biology, you may visit <https://sbasse.lums.edu.pk/department/biology>

## RESEARCH OPPORTUNITIES

Research is an essential component of the Biology graduate programme. In this context, graduate students in Biology are exposed to advanced courses in a wide range of research areas. Different research groups in Biology led by individual faculty members are as follows:

- **Biochemistry and Structural Biology**  
Dr. Syed Shahzad ul Hussan
- **Cell Signalling and Cancer Therapeutics**  
Dr. Amir Faisal
- **Computational Genomics and Systems Biology**  
Dr. Aziz Mithani
- **Epigenetics**  
Dr. Muhammad Tariq
- **Molecular Epidemiology and Microbiology**  
Dr. Shaper Mirza
- **Plant Molecular Biology**  
Dr. Ahmed Jawaad Afzal
- **Systems Biology, Proteomics and Health Informatics**  
Dr. Safee Ullah Chaudhary
- **Translational Bioinformatics**  
Dr. Syeda Kahkeshan Hijazi



*"LUMS has been a great learning experience, particularly while teaching and mentoring the best talent of the country. I established a research programme focusing on virus related structural biology, to conduct research at a molecular level, to find a cure for viral infections. I strongly believe that the 'no compromise on quality and merit' philosophy of LUMS, makes this institute distinct from other institutes in the country."*

**Dr. Syed Shahzad ul Hussan**  
Department of Biology,  
SBASSE

# Department of Chemistry and Chemical Engineering

The Department of Chemistry and Chemical Engineering aspires to establish itself as an internationally recognised and globally competitive centre for graduate teaching and research in a wide variety of chemical disciplines that include Nanoscience and Nanotechnology, Materials Chemistry, Catalysis, Drug Discovery and Medicinal Chemistry. In the near future, the Department of Chemistry and Chemical Engineering is also expected to initiate its research-intensive science-based Chemical Engineering programme to educate tomorrow's leaders in modern Chemical Engineering and to support Pakistan's growing chemical industry.

The graduate programme in Chemistry is an exciting opportunity for students to take advantage of the department's conducive and thriving research environment and to further contribute effectively to the development of science. The mission of the department is to produce outstanding graduates who can excel in academia and the industry and hence become future leaders.

## DID YOU KNOW?



**Highly sought after graduates for both technical and managerial careers**



**Chemistry teaching and research labs are well equipped with state-of-the-art experimental facilities and supplies including spectroscopic, structural and materials characterisation tools**

## FACULTY

The Chemistry and Chemical Engineering faculty is committed to achieving excellence in teaching and developing world-class research programmes especially at the interface of Chemistry and other Science and Engineering disciplines.

- **Dr. Basit Yameen** (PhD, Max Plank Institute for Polymer Research, Mainz, Germany)
- **Dr. Ghayoor Abbas Chotana** (PhD, Michigan State University, USA)
- **Dr. Irshad Hussain** (PhD, University of Liverpool, UK)
- **Dr. Muhammad Zaheer** (PhD, University of Bayreuth, Germany)
- **Dr. Salman Noshear Arshad** (PhD, University of Illinois at Urbana-Champaign, USA)
- **Dr. Falak Sher** (PhD, University of Cambridge, UK)
- **Dr. Habib-ur-Rehman** (PhD, Institute for New Materials, Germany)
- **Dr. Muhammad Saeed** (PhD, University of Tubingen, Germany)
- **Dr. Rahman S. Z. Saleem** (PhD, Michigan State University, USA)
- **Aniqa Sardar** (Master of Research, Imperial College London, UK)

## RESEARCH OPPORTUNITIES

The Department of Chemistry and Chemical Engineering comprises of a diverse group of research active faculty members. In addition to the traditional areas of Chemical Sciences, they work on interdisciplinary research projects interfacing Chemistry with other Science and Engineering disciplines. Faculty members and their research interests are listed below:

- **Catalysis and Green Chemistry**  
Dr. Ghayoor Abbas
- **Multifunctional Nanocomposites**  
Dr. Salman Noshear Arshad
- **Functional Nanomaterials**  
Dr. Irshad Hussain
- **Polymers and Nanocomposites**  
Dr. Habib-ur-Rehman
- **Synthetic, Organic and Bioorganic Chemistry and Chemical Biology**  
Dr. Muhammad Saeed
- **Drug Discovery**  
Dr. Rahman S. Z. Saleem
- **Solid State Chemistry**  
Dr. Falak Sher
- **Soft Matter and Interfaces**  
Dr. Basit Yameen
- **Catalyst Design**  
Dr. Muhammad Zaheer

## RESEARCH FACILITIES

- Extensive research programmes in the fields of Nanoscience and Nanomedicine, Cancer Therapeutics, Drug Discovery and Delivery, Synthetic Organic Chemistry, Green Chemistry and Catalysis, Renewable Energy, Polymers and Nanocomposites, Organometallic Chemistry, Electronic Materials, Natural Product Chemistry, Biomass Conversion and Environmental Chemistry
- The Chemistry faculty has developed impactful international collaborations with prominent national and international research groups in the USA, UK, Germany, Switzerland, Turkey, China and Saudi Arabia. These collaborations are instrumental in keeping the faculty abreast with the latest developments in the field and to use advanced technology platforms and high-tech equipment that is currently not available anywhere in Pakistan
- Chemistry department's laboratories are well equipped with state-of-the-art experimental facilities and equipment. There is a fine collection of supplies and equipment including spectroscopic, structural and materials characterisation tools



*"I have been privileged to have spent nine years at SBASSE and I have assumed both the role of a researcher as well as a teacher. As a teacher, I have been honoured to develop and teach a variety of courses to graduate students. As a researcher, I have travelled to conferences around the world and co-authored research papers with colleagues from Europe and North America. I strongly believe that not only do the graduate degree programmes at LUMS have the necessary rigour in their curricula, but they also equip students with strong work ethics and useful practical skills that can greatly help them grow in their professional careers."*

**Dr. Falak Sher**  
**Department of Chemistry,**  
**SBASSE**

If you need more information on any of these programmes and research being conducted at the Department of Chemistry and Chemical Engineering, you may visit <https://sbasse.lums.edu.pk/department/chemistry>

# Department of Computer Science

The Department of Computer Science at SBASSE will help you stay on top of growing trends in information and technology. It equips you with first-hand experience of the quality work being done in the areas of Computer Vision, Data Mining, Polymers and Nanocomposites, Networks, Information Security, Privacy and Distributed Systems, Software Engineering, Human Computer Interaction, Big Data, Artificial Intelligence and Robotics.

As an integral element of a graduate education, the Department of Computer Science at SBASSE provides unmatched research possibilities, opportunities and resources. The Department not only encourages students to get involved in rigorous research alongside coursework but also provides fully equipped clusters, groups and laboratories.

## DID YOU KNOW?



**100% success rate of admissions to fully funded graduate programmes of the world's top universities. Our MS Programme attracts the best students from around the region. Since our graduate programme is renowned internationally, it gives its graduates an edge in the global career market**



**Our success in innovative scientific research is evident from our students' and faculty's rigorous research work and publications in renowned journals including ACM transactions and IEEE transactions and participation in topflight ACM Special Interest Groups sponsored conferences**

## FACULTY

The faculty members at the Department of Computer Science at SBASSE, have years of experience exhibited not only through their taught courses and curriculum but also through their rigorous research work and publications in renowned journals.

- **Dr. Naveed Arshad** (PhD, University of Colorado at Boulder, USA)
- **Dr. Arif Zaman** (PhD, Stanford University, USA)
- **Dr. Asim Karim** (PhD, The Ohio State University, USA)
- **Dr. Mian M. Awais** (PhD, Imperial College London, UK)
- **Dr. Shafay Shamail** (PhD, University of Bath, UK)
- **Dr. Zartash A. Uzmi** (PhD, Stanford University, USA)
- **Dr. Basit Shafiq** (PhD, Purdue University, USA)
- **Dr. Hamid Abdul Basit** (PhD, National University of Singapore, Singapore)
- **Dr. M Fareed Zaffar** (PhD, Duke University, USA)
- **Dr. Ihsan Ayyub Qazi** (PhD, University of Pittsburgh, USA)
- **Dr. Murtaza Taj** (PhD, Queen Mary University of London, UK)
- **Dr. Junaid Haroon Siddiqui** (PhD, University of Texas at Austin, USA)
- **Dr. Imdad Ullah Khan** (PhD, Rutgers, The State University of New Jersey, USA)
- **Dr. Suleman Shahid** (PhD, Tilburg University, Tilburg, Netherlands)
- **Dr. M Hamad Alizai** (PhD, RWTH Aachen University, Germany)
- **Dr. Yasir Mehmood** (PhD, Pompeu Fabra University Barcelona, Spain)
- **Dr. Humaira Kamal** (PhD, University of British Columbia, Vancouver, Canada)

## RESEARCH OPPORTUNITIES

Faculty members and their core research areas

- **Computer Vision**  
Dr. Murtaza Taj  
Dr. Sohaib Ahmed Khan
- **Data Mining**  
Dr. Asim Karim  
Dr. Arif Zaman  
Dr. Yasir Mehmood
- **Systems and Networks**  
Dr. Muhammad Fareed Zaffer  
Dr. Ihsan Ayyub Qazi  
Dr. Basit Shafiq  
Dr. Zartash Afzal Uzmi  
Dr. Hamad Alizai  
Dr. Humaira Kamal
- **Software Engineering**  
Dr. Hamid Abdul Basit  
Dr. Naveed Arshad  
Dr. Junaid Haroon Siddiqui  
Dr. Shafay Shamail  
Dr. Suleman Shahid
- **Algorithms and Theory of Computation**  
Dr. Imdad Ullah Khan  
Dr. Arif Zaman
- **Artificial Intelligence and Robotics**  
Dr. Mian Muhammad Awais

## RESEARCH FACILITIES

The department offers state-of-the-art research laboratories. These include:

- Computer Vision Laboratory
- Robotics and Intelligent Computing (RICE) Laboratory
- Knowledge and Data Engineering (KADE) Laboratory
- Software Engineering Research Laboratory (SERL)
- Networks and Systems Group (NSG)
- Programme Analysis Group (PAG)
- Technology for People Initiative (TPI)
- Computer Human Interaction and Social Experience Laboratory (CHISEL)
- Embedded Systems and Networks (SYSNET) Laboratory



*"The charm of our Computer Science graduate programme stems from its exceptional faculty and great students; together we have made thriving research journeys to many Computer Science sectors including Networks and Systems, Software Engineering, Computer Vision and Data Science. Our graduate programme has attracted a steady stream of outstanding students who have started successful careers. If you have the will, we have the way: an inspiring teaching and research culture for you to fulfil your Computer Science dreams!"*

**Dr. Muhammad Hamad Alizai**  
Department of Computer Science,  
SBASSE

# Department of Electrical Engineering

The Department of Electrical Engineering at SBASSE offers internationally reputable MS and PhD programmes, providing a research environment that is equally supported by international collaborations. The Electrical Engineering programme gives students both a strong foundation in contemporary areas of Electrical Engineering including Communication Systems, Computer Networks, Embedded Systems, Nano-electronics, VLSI Design Signal Processing, Control Systems, Robotics, Renewable Energy Systems and Optoelectronics. Students are also strongly encouraged to collaborate with other disciplines at SBASSE.

## FACULTY

The Department of Electrical Engineering hosts a growing research-active, full-time faculty with PhDs from the world's top institutes. The Electrical Engineering faculty is committed to solving important issues pertaining to a wide range of areas.

- **Dr. Abubakr Muhammad** (PhD, Georgia Institute of Technology, USA)
- **Dr. Farasat Munir** (PhD, Georgia Institute of Technology, USA)
- **Dr. Ijaz Haider Naqvi** (PhD, IETR-INSA, Rennes, France)
- **Dr. Momin Ayub Uppal** (PhD, Texas A&M University, USA)
- **Dr. Muhammad Awais Bin Altaf** (PhD, Masdar Institute of Science and Technology, UAE)
- **Dr. Muhammad Tahir** (PhD, Polytechnic University of Turin, Italy)
- **Dr. Nadeem Ahmed Khan** (PhD, Eindhoven University of Technology, Netherlands)
- **Dr. Nauman Zafar Butt** (PhD, Purdue University, USA)
- **Dr. Shahid Masud** (PhD, Queen's University, United Kingdom)
- **Dr. Tariq Mahmood Jadoon** (PhD, University of Strathclyde, United Kingdom)
- **Dr. Zartash Afzal Uzmi** (PhD, Stanford University, USA)
- **Dr. Ahmad Kamal Nasir** (PhD, University of Siegen, Germany)
- **Dr. Hassan Abbas Khan** (PhD, University of Manchester, United Kingdom)
- **Dr. Imran Cheema** (PhD, McGill University, Canada)
- **Muhammad Adeel Pasha** (PhD, University of Rennes-1, France)
- **Dr. Muhammad Jahangir Ikram** (PhD, University of Manchester, United Kingdom)
- **Dr. Muhammad Zubair** (PhD, Australian National University, Australia)
- **Nauman Ahmad Zaffar** (MS, University of Pennsylvania, USA)
- **Dr. Naveed Ul Hassan** (PhD, University of Paris 11, France)
- **Dr. Syed Azer Reza** (PhD, University of Central Florida, USA)
- **Dr. Wala Saadeh** (PhD, Masdar Institute of Science and Technology, UAE)
- **Dr. Wasif Tanveer Khan** (PhD, Georgia Institute of Technology, USA)

## RESEARCH LABS/CLUSTERS LED BY FACULTY MEMBERS

- **Advanced Communications Research Laboratory**  
Dr. Momin Uppal  
Dr. Ijaz Haider  
Dr. Naveed Ul Hassan
- **WCyber Physical Networks and Systems Laboratory**  
Dr. Abubakr Muhammad
- **Signal, Image and Video Processing Laboratory**  
Dr. Nadeem Khan  
Dr. Muhammad Tariq  
Dr. Muhammad Zubair  
Dr. Waqas Majeed
- **Energy and Power Systems Cluster**  
Nauman Ahmad Zaffer  
Dr. Hassan Abbas Khan
- **Electronics and Embedded Systems Cluster**  
Dr. M. Adeel Pasha  
Dr. Jahangir Ikram  
Dr. Shahid Masud
- **Devices, Optics and Electromagnetics Cluster/ Bio-Agri-Photonics Laboratory (BAP)**  
Dr. Hassan Abbas Khan  
Dr. Syed Azer Reza  
Dr. Imran Cheema  
Dr. Sabieh Anwar  
Dr. Muhammad Faryad  
Dr. Mumtaz Sheikh  
Dr. Farasat Munir  
Dr. Wasif Tanveer
- **Semiconductor and Nanoelectronic Devices (SND) Laboratory**  
Dr. Nauman Zafar Butt
- **AI and Robotics in Precision Agriculture and Forestry**  
Dr. Ahmad Kamal Nasir  
Dr. Mian Muhammad Awais
- **RAMCASP Research Laboratory**  
Dr. Wasif Tanveer

## DID YOU KNOW?



With over 22 PhD faculty members, the Electrical Engineering department is the largest department in SBASSE



Won the highest funding in competitive grants for any single department in SBASSE in the last year



*"The thing I like most about LUMS is the independence one experiences. With exemplary colleagues all around and brilliant students to teach and supervise, LUMS is nothing short of a dream institution for an academician. Because of the support that LUMS provides for research and mobility and an environment, which is research supportive, I have been able to achieve awards for my externally funded projects from the Ministry of Science and Technology and the Research Productivity Award by Pakistan Council for Science and Technology. I dedicate these awards to LUMS."*

**Dr. Ijaz Naqvi**  
Department of Electrical Engineering,  
SBASSE

# Department of Mathematics

Mathematics is the most fundamental of all the sciences and also the most applicable as it is the rigorous study of structure, relationships and pattern. The faculty at the Department of Mathematics works across a wide spectrum of Mathematical fields. The Department is dedicated to conducting research work in pure as well as Applied Mathematics. Some examples of interests within pure Mathematics are Algebraic Geometry, Algebraic Topology, Combinatorial Commutative Algebra, Functional Analysis, Fixed Point Theory, Operator Theory and Symmetries of Differential Equations. In Applied Mathematics, zones of interest include Computational Statistical Mechanics, Numerical Methods, Mathematical and Computational Biology, Stochastic Processes and Epidemiology and Cancer Kinetics.

## FACULTY

The faculty at the Department of Mathematics works across a wide spectrum of Mathematical fields. The Mathematics faculty that hails from some of world's finest institutions is listed below:

- **Dr. Adnan Khan** (PhD, Rensselaer Polytechnic Institute, USA)
- **Dr. Ali Ashher Zaidi** (PhD, Massey University, New Zealand)
- **Dr. Amer Rasheed** (PhD, Centre de Mathématiques Appliquées, INSA de Rennes, European University of Bretagne Rennes, France)
- **Dr. Haniya Azam** (PhD, Government College University, Pakistan)
- **Dr. Imran Naeem** (PhD, University of Witwatersrand, South Africa)
- **Dr. Masood Hussain Shah** (PhD, University of Aberdeen, United Kingdom)
- **Dr. Muddassar Razzaq** (PhD, Technical University of Dortmund, Germany)
- **Dr. Muhammad Ahsan** (PhD, Central European University, Hungary)
- **Dr. Muhammad Usman** (PhD, Imperial College London, United Kingdom)
- **Dr. Muhammad Imran Qureshi** (PhD, University of Oxford, United Kingdom)
- **Dr. Shaheen Nazir** (PhD, Government College University, Pakistan)
- **Dr. Sultan Sial** (PhD, University of Western Ontario, Canada)
- **Dr. Azmat Hussain** (PhD, North Carolina State University, USA)
- **Hira Nadeem** (MSc, Florida Atlantic University, USA)
- **Kamran Rashid** (MS, University of Wisconsin-Madison, USA)

## RESEARCH OPPORTUNITIES

From Analysis and Algebra to High Performance Computation and Mathematical Biology, the faculty at the Department of Mathematics is involved in research across a broad spectrum. Brief descriptions of the faculty's research areas are given here.

- **Algebraic Topology**  
Dr. Haniya Azam
- **Spectral Theory**  
Dr. Muhammad Usman
- **Operator Theory**  
Dr. Masood Hussain Shah
- **Evolution Equations**  
Dr. Imran Naeem  
Dr. Muhammad Ahsan
- **Scientific Computation**  
Dr. Sultan Sial, Dr. Amer Rasheed  
Dr. Muddassar Razzaq
- **Algebraic Geometry**  
Dr. Muhammad Imran Qureshi  
Dr. Shaheen Nazir
- **Mathematical Biology, Mathematical Analysis**  
Dr. Adnan Khan  
Dr. Ashher Zaidi
- **Financial Mathematics, Stochastic Portfolio**  
Dr. Azmat Hussain
- **Numerics for Life (NUMLife)**  
Dr. Muddassar Razzaq
- **Fluid Structure Interaction Optimisation**  
Dr. Muddassar Razzaq

## DID YOU KNOW?



**LUMS Mathematics Department ranked Number 1 in Pakistan by the QS World University Rankings 2016 by Subject**



**The High Performance Cluster Computing Centre provides computing facilities to faculty and students with specialised computational needs**

## RESEARCH FACILITIES

- Research laboratories working in the area of Financial Mathematics, Stochastic Portfolio, Spectral Theory, Mathematical Analysis, Algebraic Geometry, Scientific Computation, Evolution Equations, Operator Theory and Algebraic Topology
- The High Performance Computing Centre provides computing facilities to faculty and students with specialised computational needs; engenders and facilitates Science and Engineering research efforts and provides research and development exposure to students
- The Centre for Advanced Studies in Mathematics (CASM) promotes the role of Mathematics in formulating and solving interdisciplinary problems among students, which is pivotal for scientific progress in every society. It organises conferences, workshops and seminars for a conducive research environment and strengthens international collaborations with the mathematics community



*"Mathematics is the language that gives us words for telling stories about order, structure, and pattern. Sometimes the stories that we tell are about Mathematics itself; this we call Pure Mathematics, and sometimes these stories are about the natural world; this we call, Applied Mathematics. At LUMS, I have been fortunate to learn from and work with colleagues and students investigating problems related to Disease Modelling, Fibre Optics, Spin Systems, Complex Fluids and Nanotube Networks. If you are interested in Mathematical Biology, Computational Physics or Numerical Methods, then I believe that there is no better place in Pakistan to pursue graduate studies than LUMS."*

**Dr. Sultan Sial**  
Department of Mathematics,  
SBASSE

# Department of Physics

The Department of Physics at SBASSE focuses on probing fundamental physical aspects of the universe and the underlying mathematics, as well as novel applications in diverse areas including Nanoscience, Optics, Nanophotonics, Quantum Dynamics, Spin and Photon Physics, Fundamental Theory, Photonics, Organic Semiconductor Optoelectronics, Cosmology and Magnetic Materials.

An important character of the Department of Physics is embodied in encouraging students to get involved in research questions and exploratory experiments outside the formal classroom or laboratory coursework. Regular seminars and colloquia are led by the faculty, students and distinguished speakers from outside LUMS and provide a chance to keep abreast of cutting edge and high impact research.

## DID YOU KNOW?



**Our top ranked faculty are part of national committees providing leadership to the country's science-related programmes**



**Strong faculty-student ratio, leading to robust mentorship and student-centred class interactions**



**Teaching and research support provided to other universities in Pakistan**



**Physics teaching laboratories successfully replicated at other universities in Pakistan**

## FACULTY

The Department of Physics hosts a research-active, full-time faculty with PhDs from the world's top institutes. They are committed to solving important issues pertaining to a wide range of areas.

- **Dr. Muhammad Sabieh Anwar** (DPhil, University of Oxford, UK)
- **Dr. Babar Ahmed Qureshi** (PhD, Syracuse University, USA)
- **Dr. Mumtaz Ali Sheikh** (PhD, University of Central Florida, USA)
- **Dr. Muhammad Faryad** (PhD, Pennsylvania State University, USA)
- **Dr. Adam Zaman Chaudhry** (PhD, National University of Singapore, Singapore)
- **Dr. Maqbool Ahmed** (PhD, Syracuse University, USA)
- **Dr. Ata ul Haq** (PhD, University of Stuttgart, Germany)
- **Dr. Ammar Ahmed Khan** (PhD, University of Cambridge, UK)

## RESEARCH FACILITIES

- Laboratories in Solid State Physics, Nanoscience, Optics and Photonics, Radiation Physics and Measurement and Instrumentation house mostly home-grown facilities in diverse areas of Physics including synthesis of new materials, cryogenic and high temperature transport, electrical, thermal and magnetic properties measurements, homebuilt atomic force microscopy and magnetic resonance devices, optical spectroscopy, optical and Kerr

## RESEARCH OPPORTUNITIES

The Physics faculty is actively engaged in the cutting-edge research in the leading areas of research in the Basic and Applied Physics. Both the theoretical and experimental research is being conducted in the Department with the active involvement of the graduate students. Faculty members and their research interest are listed below:

- **Spin and Photon Physics**  
Dr. Muhammad Sabieh Anwar
- **Quantum Dynamics**  
Dr. Adam Zaman Chaudhry
- **Plasmonics and Nanoengineered Materials**  
Dr. Muhammad Faryad
- **Fundamental Theory**  
Dr. Babar Ahmed Qureshi
- **Photonics**  
Dr. Mumtaz Ali Sheikh
- **Cosmology**  
Dr. Maqbool Ahmed
- **Quantum Photonics**  
Dr. Ammar Ahmed Khan
- **Organic Semiconductor Optoelectronics**  
Dr. Ata Ul Haq

microscopy, sensitive imaging, light modulation, radiation detection, X-ray fluorescence, quantum optics, single photon detection, electrodeposition, electro spinning, sputter coating, and high speed electronic test and measurement equipment, to name a few

- Research groups being headed by various faculty members aiming to explore various fields of Physics



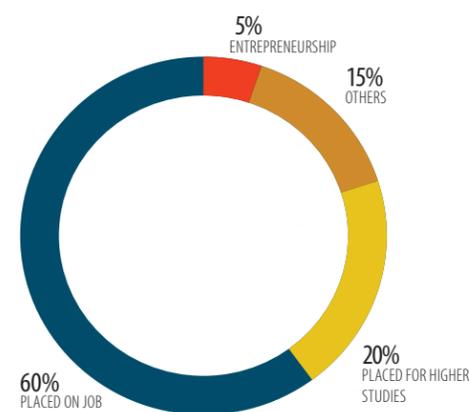
*"I joined LUMS three years ago and never looked back. LUMS has provided me with a world-class teaching and research environment to utilise my full potential. The inquisitive and hardworking students make teaching a worthwhile effort and greatly rewarding experience that has enriched me academically. The logistical support for research and highly competitive research environment has broadened my research horizon to include new avenues."*

**Dr. Muhammad Faryad**  
Department of Physics,  
SBASSE

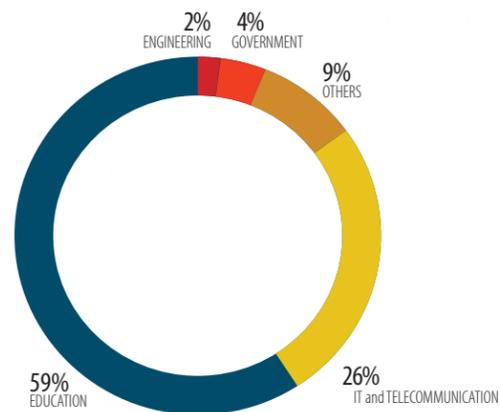
If you need more information on any of these programmes and research work being done by the department of Physics, you may visit <https://sbasse.lums.edu.pk/department/physics>

# Career Opportunities

PLACEMENT SUMMARY  
GRADUATE CLASS OF 2016



SECTOR WISE JOB PLACEMENTS  
GRADUATE CLASS OF 2016



- SBASSE graduates have ample amount of opportunities to pursue. They receive offers from leading universities of the world like **Massachusetts Institute of Technology, Stanford University, University of Oxford, University of Cambridge, Harvard University and University of Illinois Urbana-Champaign** to pursue higher studies.
- Graduates from SBASSE find direct placements at various national as well as international companies like **Google, Microsoft, Facebook, IBM, McKinsey & Company, Bain & Company, Unilever, Procter & Gamble, L'Oréal, Philip Morris International, Mitsubishi Corporation, Nestlé, Reckitt Benckiser, PepsiCo, Coca-Cola Beverages Ltd, Jazz, Ufone, Dawood Hercules Corporation Ltd, Engro Corporation, Standard Chartered Bank, Habib Bank Limited, House of Habib** etc.
- MS and PhD students work alongside faculty members at SBASSE as **Teaching Assistants and Research Assistants**.



# Your Student Experience at SBASSE

## HAPPENINGS AT SBASSE



### LUMS Launches three Mobile Apps for Autistic Children at World Autism Awareness Day

LUMS in collaboration with Autism Spectrum Disorders Welfare Trust (ASDWT), organised the World Autism Awareness Day at LUMS on April 2, 2017. The purpose was to raise awareness about Autism and to show how assistive technologies can be used to improve the quality of the lives of autistic children in Pakistan.



### LUMS Team Participates in the Shell Eco-Marathon Asia in Singapore

A team comprising of 7 students from the Department of Electrical Engineering at SBASSE participated in the first ever Shell Eco-marathon Asia.



### Centre for Advanced Studies in Mathematics (CASM) held an International Conference on Applied Mathematics

The conference aimed to provide a platform for researchers, scientists, engineers, academics and professionals to present their recent research work and to explore future trends in various areas of Applied Mathematics.



### Highlights from The Wall Street Journal

Muhammad H. Zaman, a member of the LUMS Syed Babar Ali School of Science and Engineering Board of Advisors and a Howard Hughes Medical Institute Professor, Department of Biomedical Engineering and International Health, Boston University has created a device, PharmaChk, which detects fake medicines. His device, recently featured in the Wall Street Journal was named one of Scientific American's "world-changing ideas" of 2013.



### Design Society held UX Pakistan Conference at LUMS

INDEX, the Design Society at LUMS in collaboration with the Computer Human Interaction and Social Experience Laboratory at the LUMS Department of Computer Science and UX Pakistan, arranged Pakistan's inaugural UX focused conference. The aim of the conference was to establish a dialogue for UX-enthusiasts from Pakistan and serve as a platform to share and promote knowledge in design for user experience.



### SBASSE Faculty Receives Research Productivity Awards 2016-17

Every year the Ministry of Science and Technology in collaboration with Pakistan Council for Science and Technology (PCST) grants Research Productivity Award (RPA) to active scientists on the basis of their publications in international journals, patents, books, PhD student supervision and external research grants. This year four of our faculty members, Dr. Ijaz Haider Naqvi, Dr. Naveed Ul Hassan, Dr. Muhammad Zaheer and Dr. Irshad Hussain of SBASSE have successfully been awarded the Research Productivity Awards in different fields.



### Mr. Hafiz Muhammad Noman Amin represented LUMS at IWANN 2017 in Bilkent University, Turkey

Mr. Hafiz Muhammad Noman Amin, Laboratory Engineer in the Central Laboratories of Syed Babar Ali School of Science and Engineering, was selected for participation in the "7th International Workshop on Applications of Nanoscience and Nanotechnology (IWANN 2017)".

The students at SBASSE can benefit from the following research centres housed at SBASSE:

#### CENTRE FOR ADVANCED STUDIES IN MATHEMATICS (CASM)

- Leading centre for the promotion of Mathematics in Pakistan
- Conducts research, organising workshops and conferences

#### CENTRE FOR HIGH PERFORMANCE COMPUTING

- Provides scientific computing facilities for the LUMS research community
- Caters to the research and course needs of the Departments of Electrical Engineering, Computer Science, Mathematics, Biology, Physics, Economics and the LUMS Suleman Dawood School of Business

#### CENTRE FOR WATER INFORMATICS & TECHNOLOGY (WIT)

- A platform with a disciplinary focus on hydro-informatics and systems analysis, by engaging faculty and students from all departments of SBASSE
- Forges collaborations among the different schools within LUMS to provide the much needed, interdisciplinary perspective to water issues

# Eligibility Criteria

## ADMISSION CRITERIA

Applicants will be assessed on the following criteria:

- 1 Academic Record
- 2 Performance in the Admission Test
- 3 Interview (if called)
- 4 Application form and supporting documents

**Note:** This is the minimum criteria that applicants need to fulfil in order to be eligible to apply. Fulfilment of this criteria does not guarantee admission into LUMS.

## 1 ACADEMIC RECORD

### FOR MS PROGRAMMES

- A minimum of 16 years of education is required for applying to the MS Programme. Applicants are expected to have obtained their Bachelor's (or Master's) degree from a national or foreign institutions that are accredited or recognised by the Higher Education Commission (HEC), Pakistan
- Applicants must have maintained a CGPA of at least 2.4 (on a scale of 4) or at least 60% marks in all university-level degrees (4 years Bachelor's degree or 2 years BSc degree and 2 years MSc degree)
- Applicants applying to the MS Computer Science must have secured at least 60% marks in their FSc exams. A level students must have at least 65% marks on IBCC equivalence scale with not more than 1 D grade

### IMPORTANT INFORMATION

- For PhD admissions, applicants having their Master's degree with a CGPA computed over any scale other than 4.0 will be required to submit a letter/revised transcript from their respective university or a letter from HEC affirming that the applicant meets the CGPA requirement for PhD admission

### FOR PhD PROGRAMMES

- A minimum of 18 years of education is required for applying to the PhD Programme. Applicants are expected to have obtained their Master's degree (MS or MPhil) from a national or foreign institutions that are accredited or recognised by the Higher Education Commission (HEC), Pakistan
- Applicants must have obtained a CGPA of at least 3.0 (on a scale of 4) or First Division (in the annual system) in their Master's degree and at least a CGPA of 2.4 (on a scale of 4) or 60% marks in the Bachelor's degree. Applicants obtaining 2 years BSc degree and 2 years MSc degree must have secured at least 60% marks in both degrees
- Applicants applying to the PhD Computer Science must have secured at least 60% marks in their FSc exam. A Level students must have at least 65% marks on IBCC equivalence scale with not more than 1 D grade

- Applicants who have obtained their degrees from institutions that are not listed with the Higher Education Commission (HEC), Pakistan will be required to obtain an equivalence certificate from HEC.

For further information please visit:  
[www.hec.gov.pk](http://www.hec.gov.pk)

Applicants applying for the MS Programme must have their Bachelor's (or Master's) degree in the following disciplines. Similarly, applicants applying to the PhD Programme must have their Master's degree in any one of the following areas:

### BIOLOGY

- Biology
- Biochemistry
- Bioinformatics
- Molecular Biology
- Microbiology
- Genetics
- Other closely related discipline

Applicants may also have the following degrees:

### MBBS | BDS | Pharm-D

Applicants with professional degrees (including, MBBS, BDS, Pharm-B) must have Second Division or above in their professional degrees in order to be considered eligible for MS/PhD.

### CHEMISTRY

- Chemistry
- Biochemistry
- Materials Science or Engineering
- Chemical Engineering
- Other closely related discipline

### COMPUTER SCIENCE

- Computer Science
- Software Engineering
- Information Technology
- Computer Engineering
- Electrical Engineering

**For PhD:** Other closely related disciplines

**For MS:** Other closely related disciplines that are aligned with computing (e.g., Mathematics, Statistics, Accounting, Economics or Management Sciences) and involve rigorous coursework in Mathematics and strong programming background

### MATHEMATICS

- Mathematics
- Statistics
- Physics
- Any other closely related disciplines determined by the Mathematics Graduate Committee

### ELECTRICAL ENGINEERING

- Electrical Engineering
- Electronics
- Computer Science
- Engineering/Applied Physics
- Mechatronics Engineering
- Computer Engineering
- Telecom Engineering
- Other engineering disciplines peripherally related to Electronics or Electrical Engineering

### PHYSICS

- Physics
- Mathematics
- Computer Science
- Materials Science
- Optics
- Engineering
- Other closely related disciplines or allied Engineering disciplines

## 2 PERFORMANCE IN ADMISSION TESTS (MS/PhD PROGRAMME)

### FINANCIAL SUPPORT

- Loan Options
- Merit Scholarships
- External Scholarships (if available)
- Teaching Assistantships (if available)
- 100% Scholarship for PhD students
- Generous Tuition Fee Waivers for all MS Basic Sciences and Mathematics Students

For details, visit:

<https://financial-aid.lums.edu.pk>

### LOCAL APPLICANTS

Applicants residing in Pakistan are required to take **two (2)** admission tests in order to be considered for MS/PhD admission:

#### 1. LUMS Graduate Admission Test (LGAT)

Applicants applying to the MS/PhD programmes are required to take the **LUMS Graduate Admission Test (LGAT)**, which is comprised of **Quantitative, Verbal and Analytical sections**.

#### 2. LUMS SBASSE Subject Test

(Biology, Chemistry, Physics, Mathematics, Electrical Engineering and Computer Science). In addition to LGAT, applicants must also take the **LUMS SBASSE Subject Test** in their respective disciplines.

LGAT and SBASSE Subject Test will be scheduled at the same time in Lahore, Islamabad and Karachi on **April 08, 2018**.

#### Exemption for applicants who have taken Graduate Record Examination (GRE) Tests

- Applicants who have taken the **Graduate Record Examination (GRE)** General Test through **Educational Testing Service (ETS), USA** during the last two years and obtained an aggregate score of 300 in the

Quantitative and Verbal sections may choose not to take the **LUMS Graduate Admission Test (LGAT)**.

- Applicants are exempted from **LUMS SBASSE Subject Test** if they have taken **GRE Subject Test** during the **last two years** and obtained a score at the **60<sup>th</sup> percentile** or above in the discipline they are applying to. Following is the detail:

- **Biology:** GRE Subject Test in Biology/Biochemistry/Cell and Molecular Biology
- **Chemistry:** GRE Subject Test in Chemistry
- **Mathematics:** GRE Subject Test in Mathematics
- **Physics:** GRE Subject Test in Physics

- Applicants applying for **Computer Science** and **Electrical Engineering** are required to take the **LUMS SBASSE Subject Test** on **April 08, 2018** due to the unavailability of a GRE Subject Test in Computer Science and Electrical Engineering.

The deadline to take **GRE General/GRE Subject Test** (if applicable) is **April 08, 2018**. The College code for reporting GRE scores to LUMS is **0679**.

## 3 INTERVIEW

### OVERSEAS APPLICANTS

Overseas applicants are required to take the following **two (2)** admission tests in order to be considered for admission:

- **GRE (General)** and **GRE Subject Test** (Biology, Chemistry, Physics, Mathematics)
- Applicants residing outside Pakistan are required to take the **GRE (General)** as well as the **GRE Subject Test** through the Educational Testing Service (ETS), USA ([www.ets.org](http://www.ets.org)) in the disciplines mentioned above.
- Due to the unavailability of a GRE Subject Test in Computer Science, overseas applicants applying to these programmes will be assessed based on their GRE (General) Test score only.

The deadline to take **GRE General/GRE Subject Test** is **April 08, 2018** at the latest. The College code for reporting GRE scores to LUMS is **0679**.

- Shortlisted MS applicants may be called for an interview
- All shortlisted PhD applicants are required to go through an interview that includes delivery of a seminar on their MS research work

## 4 APPLICATION FORM AND SUPPORTING DOCUMENTS

In order to be considered for admission all applicants must submit a completed application form along with all required supporting documents by the stipulated deadline.

# Getting to Know Pakistan

## INTERNATIONAL STUDENTS

Pakistan came into being in 1947. The territory that now forms Pakistan was home to several ancient civilisations. Today, Pakistan is an ethnically and linguistically diverse country.

LUMS is situated in Lahore, the cultural hub of Pakistan. The city offers diverse entertainment, numerous food choices and a lifelong experience that will feed your wanderlust. Shopping malls, restaurants, cinemas, reliable public transport facilities and a network of a government owned surveillance system dot the city's landscape.

Lahore is one of the safest cities of Pakistan. The Punjab Safe Cities Authority (PSCA) established under the Punjab Safe Cities Ordinance 2015, aims to ensure establishment, development and maintenance of an integrated command, control and communication system (PPIC3) for Police in major cities of the province for public safety.

## VISA PROCESS

In order to study at LUMS, foreign nationals must obtain a "Study Visa" from the Pakistani Embassy/Consulate working in their country. The Pakistani Embassy/Consulate will only issue a study visa for students' stay at LUMS upon receipt of Higher Education Commission (HEC), Pakistan's "No Objection Certificate" and clearance from the Ministry of Interior, Pakistan.

For the issuance of Visa, students must submit relevant documents to the LUMS Admissions Office through postal mail/courier service by the stipulated deadline.

For details please visit:  
[international.lums.edu.pk](http://international.lums.edu.pk)



Create  
your own Future

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-  www.lums.edu.pk



#MERITMATTERS