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**IMAGINE  
YOUR  
FUTURE**

**MS & PhD  
BIOLOGY**

Syed Babar Ali School of Science and Engineering

# CREATING IMPACT THROUGH RESEARCH



The Syed Babar Ali School of Science and Engineering (SBASSE) at LUMS is making significant strides in the experimentation of teaching and learning, while celebrating the novelty of research. SBASSE, through innovative and impactful contributions to science and technology, is nurturing future leaders with the potential to impact society.

SBASSE offers undergraduate, graduate and doctoral degrees in a wide range of disciplines. The MS programmes at SBASSE are rigorous and designed to impart specialised professional and research-oriented training to students. To graduate, students must accumulate a total of 30 credit hours either entirely from coursework, or by completing 24 credit hours from coursework and 6 from research work/thesis. Thus all SBASSE departments offer two options to choose from: MS-by-Coursework or MS-by-Thesis.

The SBASSE PhD programmes prepare students to think scientifically and conduct high-quality research independently. Major milestones that must be achieved for the successful completion of the PhD degree include the Coursework, Comprehensive (Qualifying) Examination, Thesis Proposal Defense, at least one peer-reviewed journal article and PhD Thesis Defense.

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

## WHY CHOOSE SBASSE

### QS World University Rankings by Subject

#301-350 Computer Science and Information Systems

#351-400 Engineering – Electrical and Electronics

#401-450 Engineering and Technology

#501-550 Physics and Astronomy

### KEY INITIATIVES

#### THE ONLY 600 MHZ NMR SPECTROMETER IN THE REGION

SBASSE's 600 MHz nuclear magnetic resonance (NMR) spectrometer can be accessed for molecular analysis. Researchers can send their samples and obtain high resolution spectra, both in one and two dimensions.

#### WEB PORTAL TO ACCESS ONLINE COURSES

The School's website hosts a portal that provides access to diverse online courses produced by its faculty. The offered courses range from introductory to advanced levels.

#### MATLAB ACCESS FOR EVERYONE

A MATLAB license for everyone working at the School including faculty, staff, researchers and students provides complete access to all of its toolboxes.

#### HIGH VOLTAGE ENGINEERING LABORATORY

This lab has been established to become a nursery for important work in the field of high voltage and power systems.

#### CLOUD CLASSROOMS

SBASSE is combining virtual classrooms with real learning by introducing a blended learning solution. Roving cameras, instructor-controlled zoom,

full wall projection of participants for maximum immersiveness, ability to record and display multiple views are some of the technical capabilities.

#### CENTRAL LAB

The Lab aims at becoming the go-to place for high-end characterisation and analysis for academia and industry within the country. Student apprenticeships, restructuring of the Central Lab committee, efforts to add new equipment and a brochure to disseminate information about the Lab, all speak to this.

#### PLACEMENTS

SBASSE has top academic placements (Massachusetts Institute of Technology, Harvard University, University of Warwick, University of Oxford, University of Cambridge). Its graduates are hired by top local and international organisations (Engro Corporation, Nestle Pakistan, Systems Ltd., Microsoft, Google, Facebook).

### LEARNING WITHOUT BORDERS

Research and teaching at LUMS truly offers its community 'Learning Without Borders' by breaking academic, geographic and socio-economic barriers to make education accessible to all. The University continues to be an intellectual hub, rich with varying perspectives and transformative ideas. With an environment brimming with inclusion, unity, and boundless knowledge, learning continues in and beyond the campus walls with the aim to develop innovators, leaders and change-makers who can contribute to the community and build strong borderless networks.

### TOP QUALITY PUBLICATIONS

SBASSE faculty have produced around 300 articles, all published in international venues of prestigious ranking.

### RECOGNITION OF TOP RESEARCH THROUGH SYED BABAR ALI RESEARCH AWARDS (SBARA)

These Awards recognise PhD students. The winners, called the Syed Babar Ali Fellows, are selected for the novelty of their research work, and the potential for lasting impact to their disciplines and the society.



# MS | PhD BIOLOGY

## How will you launch your new world?

The Department of Life Sciences offers MS and PhD programmes with specialisations in Molecular and Cellular Biology and Bioinformatics. State-of-the-art research labs, experienced faculty and a collaborative environment, provide a competitive edge. The lectures and tutorials are backed by experiments and project work done in the laboratories.

## What will your new world invent?

Graduate students are exposed to advanced courses in a wide range of research areas and provided training in different research methodologies. For their research, students can opt from one of the following research groups led by individual faculty members:

### 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 AND GENE REGULATION

Dr. Muhammad Tariq

### PLANT BIOTECHNOLOGY AND MOLECULAR BIOLOGY

Dr. Khurram Bashir

### MOLECULAR EPIDEMIOLOGY AND MICROBIOLOGY

Dr. Shaper Mirza

### SYSTEMS BIOLOGY, COMPUTATIONAL PROTEOMICS AND HEALTH INFORMATICS

Dr. Safee Ullah Chaudhary

### CHROMATIN FUNCTIONS AND GENOME INTEGRITY

Dr. Muhammad Shoaib

### PLANT GENETICS & EPIGENETICS

Dr. Zaigham Shahzad

## How will Life Sciences help you realise your ambition?

The Department houses the following research facilities:

- State-of-the-art equipment including confocal microscope, fluorescence-activated cell sorter, fast protein liquid chromatography, MiSeq Next Generation Sequencer, conventional and real-time thermal cyclers, ultrasonic bioruptor, gel documentation systems, high-speed centrifuges, liquid reagent dispensers, tissue culture facilities and access to high resolution 600 MHz NMR
- HPC nodes as well as General Purpose Graphical Processing Units (GPGPU), including NVIDIA's Grid K2 and Tesla K40C are available at the Department
- Specialised laboratories established for using Arabidopsis, fruit flies and mammalian cells as model systems
- A dedicated facility for high-performance computing (HPC) housed within the Bioinformatics Research Laboratory

## Embrace the Life Sciences experience

- Dr. Shahzad ul Hussan and Dr. Safee Ullah Chaudhary have won the Shahid Hussain Foundation Research grants 2020 each worth PKR 1 million.
- Dr. Shaper Mirza and her team have been awarded PKR 12 million by The World Bank and HEC, to study epidemiological patterns in response to COVID-19 infection.
- Rida Zahra, MS student at the Cancer Therapeutics Lab, discovered drugs that overcome multidrug resistance through cell-based high-throughput screening. The work was published in *PLOS One*. Ms. Zahra has also secured a fully-funded PhD position at Dresden University.
- Dr. Muhammad Rizwan Riaz, who completed his PhD with Dr. Aziz Mithani, developed a web-based tool MAPPs (<https://mapps.lums.edu.pk>) for metabolic pathway prediction and network comparison. The work was published in *ACS Synthetic Biology*. Dr. Riaz is currently doing his postdoctoral research at University of Illinois at Urbana-Champaign.
- BS student Mahnoor Naseer Gondal from Dr. Safee Ullah Chaudhary's BIRL lab published her BS work in *Frontiers in Oncology*.
- PhD student Kanzal Iman, Research Associate Muhammad Farhan Khalid and BS student Amna Ghafoor from Dr. Safee Ullah Chaudhary's BIRL lab published their work in *Nucleic Acid Research*. This is the first open-source platform for top-down proteomics.
- PhD student Najma Shaheen who is working with Dr. Muhammad Tariq published her work in *Frontiers Cell and Developmental Biology* where she identified a novel regulator of gene expression in *Drosophila*.
- MS work of Muhammad Usama Tariq from Cancer Therapeutics Lab on the discovery of a dual FLT3/Aurora A inhibitor was published in *British Journal of Cancer*.
- PhD student Saira Dar and Dr. Asma Ahsan from Dr. Shahzad ul Hussan's lab published their work on HCV neutralising antibodies in *PLOS One*.



### DR. MUHAMMAD SABIEH ANWAR

Ahmad Dawood Chair, Dean and Professor, Syed Babar Ali School of Science and Engineering

"The graduate programmes in science and engineering at SBASSE are poised to make an impact. Our deepest impact as an institution would truly be made by the research that emanates from our graduate education and the research that it propels. We are committed to providing a collegial, rigorous and progressive research milieu that triggers the thirst for knowing and seeking the truth, and in the process, creating tools, gadgets, machines and ideas that address the human condition and global issues. We promise that our graduate programmes will make you ride through the two extremes of the microcosm and the macrocosm, the ideal and the practical, the abstract and the tangible. Welcome to the Syed Babar Ali School of Science and Engineering!"



## YOUR JOURNEY BEGINS HERE!

### Admission Criteria for Local and International Students

Admission is purely merit-based and rests on the following criteria:

#### MS Programme

- Academic Record
- Performance in Admission Tests
- Application Review
- Submission of complete online application, application processing fee and supporting documents by the stipulated deadline
- Interview Performance (if needed)
- Letter of Recommendation

Scan for more information



#### PhD Programme

- Academic Record
- Performance in Admission Tests
- Application Review
- Research Statement
- Submission of complete online application, application processing fee and supporting documents by the stipulated deadline
- Letters of Recommendation
- Interview Performance (if shortlisted)

**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 to LUMS.

Scan for more information



### Admission Criteria for PhD Programme for Foreign Nationals

SBASSE's PhD application for foreign nationals caters to applicants who currently reside outside Pakistan and have a foreign nationality.

All other applicants (i.e. those who have dual nationality, are Pakistani nationals, or are overseas Pakistanis) are required to apply through the regular admission application.

Admission is purely merit-based and rests on the following criteria:

- Academic Background
- Research Background
- Online Test and Interview (if shortlisted)

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.

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## FINANCIAL SUPPORT FOR LOCAL AND INTERNATIONAL STUDENTS

Admission to all LUMS programmes is purely on merit and independent of students' ability to pay the related tuition fees. Once a student has been admitted to a programme, there are several mechanisms in place to provide financial support based on need and merit. All awards are reassessed each academic year based on performance, need, available resources and prevailing University policies. LUMS is committed to providing as much financial assistance as possible within the limits of its available resources. Nevertheless, the University may not be able to meet all requests for financial assistance, and it is strongly recommended that applicants secure as much of their own funding as possible. Several funding opportunities are available to deserving MS and PhD students. These include:

- Merit Scholarships
- Partial tuition fee waivers for MS Basic Sciences students
- LUMS Interest-free Loan that covers partial to full tuition fee expense (only for local applicants)
- External Scholarships (support and eligibility for these scholarships vary depending on the donor)
- Options to work as Research or Teaching Assistants (subject to availability)
- Full funding of the PhD, which covers tuition, registration, admission fee and a monthly stipend for 4 years

Scan for more information



### DR. AMIR FAISAL

Associate Professor and Chair, Department of Life Sciences

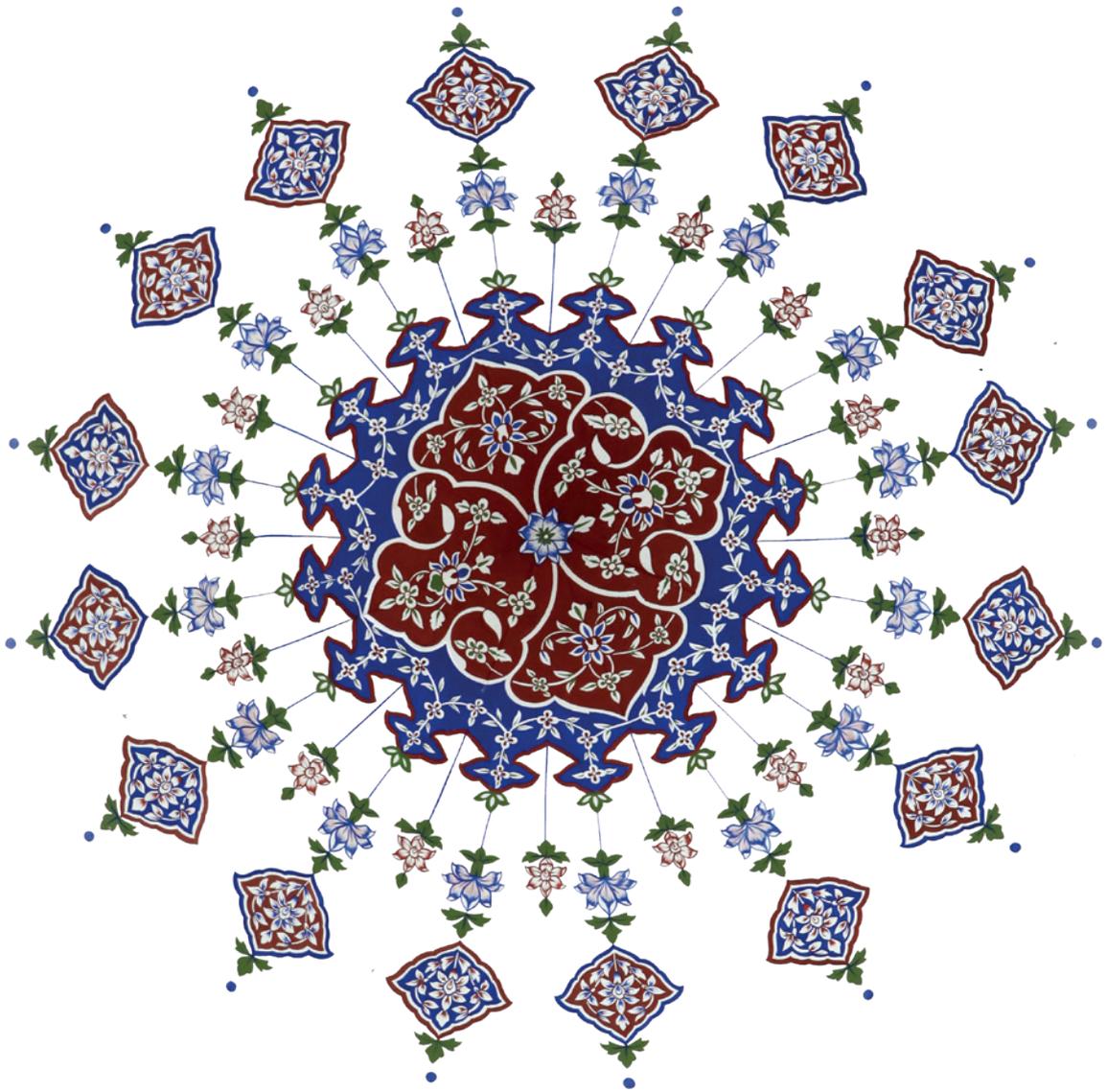
"With numerous research opportunities and state-of-the-art laboratory facilities, the Department of Life Sciences offers its students an academically rich and intellectually stimulating environment. Experienced and internationally recognised faculty members are working in diverse but overlapping research areas including Epigenetics and Gene Regulation, Structural Biology of HIV and HCV viruses, Cell Signaling and Cancer Therapeutics, Molecular Epidemiology, Drug Resistance as well as Computational and Systems Biology."



### MANAAL FATIMA

MS Biology 2017

"The MS Biology programme was an all-rounder experience for me. The multi-disciplinary approach led to meaningful learning for me. On top of that, hands-on lab work from designing to carrying out our independent projects made this programme at par with biology programmes from some of the best universities in the world."



**LUMS**

A Not-for-Profit University

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**#LearningWithoutBorders**