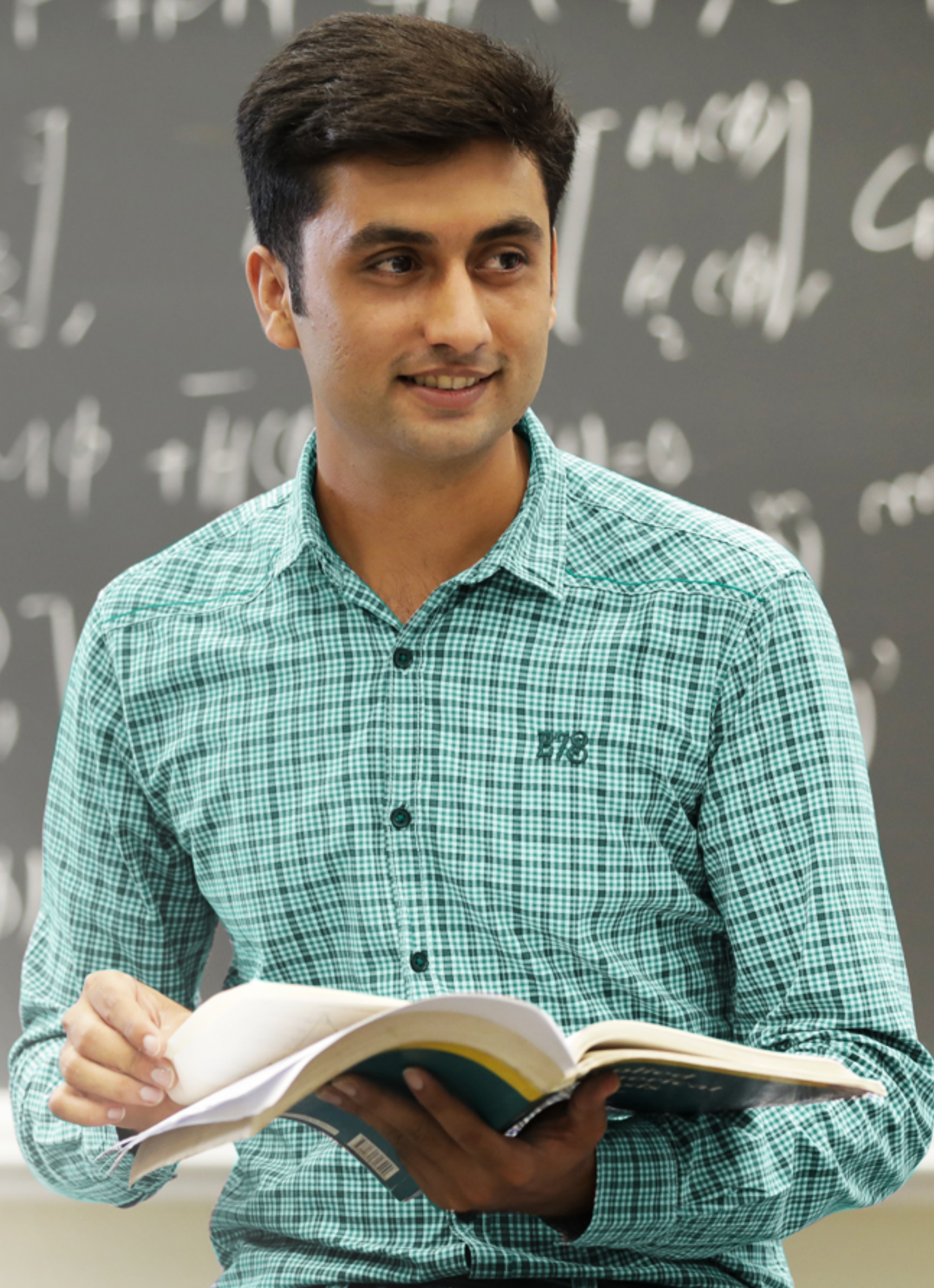


**SYED BABAR ALI SCHOOL OF SCIENCE AND ENGINEERING**

**MS & PhD**  
**MATHEMATICS**  
F A L L 2 0 2 1



IMPACT THE WORLD WITH  
**RESEARCH &  
INNOVATION**



# CREATING IMPACT THROUGH RESEARCH



# 6

## DISCIPLINES:

**BIOLOGY**

**CHEMISTRY**

**COMPUTER SCIENCE**

**ELECTRICAL ENGINEERING**

**MATHEMATICS**

**PHYSICS**

For over a decade, the Syed Babar Ali School of Science and Engineering (SBASSE) at LUMS has been imparting top-quality education with an aim to produce future leaders that can make innovative and impactful contributions to science and technology – a key to the success of any nation.

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 collecting 24 credit hours from coursework and 6 from research work/thesis. Hence, 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. 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, 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 and world-class faculty members.



# WHY CHOOSE SBASSE



## MULTIDISCIPLINARY EDUCATION

The rigorous curriculum of the graduate programmes at SBASSE offers a multidisciplinary learning environment. It provides students with the opportunity to work with knowledge drawn from all six disciplines being offered at SBASSE as a part of the free elective requirement.

## 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.



## INTERNATIONAL AND NATIONAL EXCHANGE PROGRAMMES

MS and PhD students at SBASSE participate in various exchange programmes and research opportunities sponsored by National ICT R&D Fund, HEC, Commonwealth, Erasmus-Mundus, DAAD etc.



## OUR PLACEMENTS

- Top academic placements (Massachusetts Institute of Technology, University of Warwick, London School of Economics, University of Oxford, University of Cambridge, Institute of Business Administration, Karachi, UET, Lahore, COMSATS University, Islamabad.)
- Our graduates are hired by top local and international organisations (Engro Corporation, Nestle Pakistan, Systems Ltd., Microsoft, Google, Facebook etc.)
- 64% of the SBASSE graduates have been placed on jobs and 49% who opted for higher studies received scholarships from different universities across the globe.
- MS and PhD students work alongside faculty members at SBASSE as Teaching Assistants and Research Assistants.

85+ HIGHLY QUALIFIED FACULTY MEMBERS



## TOP-QUALITY PUBLICATIONS

We involve our graduate students in impactful research. Their work has been published in top-quality, renowned journals including:

- Journal of Mathematical Analysis and Applications
- Communications in Mathematical Physics
- Journal of Physics A: Mathematical and Theoretical
- Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences
- Journal of Algebraic Combinatorics
- Journal of Combinatorial Theory, Series A
- Proceedings of the American Mathematical Society
- Journal of Computational and Applied Mathematics

## COLLABORATIONS WITH NATIONAL AND INTERNATIONAL INSTITUTES

- INRIA, Paris, France
- Helmholtz Center, Munich, Germany
- Fields Institute For Research in Mathematical Sciences, Toronto, Canada
- King Fahad University of Petroleum & Minerals, Dhahran, KSA
- NUST School of Electrical Engineering and Computer Science, Pakistan



# MS | PhD MATHEMATICS

## HOW WILL YOU LAUNCH YOUR NEW WORLD?



Mathematics is the most fundamental of all the sciences and also the most applicable, as it is the rigorous study of structure, relationships and patterns. 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, while those in Applied Mathematics include Computational Statistical Mechanics, Numerical Methods, Mathematical and Computational Biology, Stochastic Processes, Epidemiology and Cancer Kinetics.

## QUICK FACTS

- 70% GRADUATES PLACED ON JOB
- 14 PHD FACULTY MEMBERS AT THE MATHS DEPARTMENT

## WHAT WILL YOUR NEW WORLD INVENT?

Faculty at the Department of Mathematics is involved in research across a broad spectrum, from Analysis and Algebra to High Performance Computation and Mathematical Biology. Their research areas are as follows:

**ALGEBRAIC TOPOLOGY**  
DR. HANIYA AZAM

**EVOLUTION EQUATIONS**  
DR. IMRAN NAEEM  
DR. MUHAMMAD AHSAN

**MATHEMATICAL BIOLOGY,  
MATHEMATICAL ANALYSIS**  
DR. ADNAN KHAN  
DR. ASHHER ZAIDI

**SPECTRAL THEORY**  
DR. MUHAMMAD USMAN

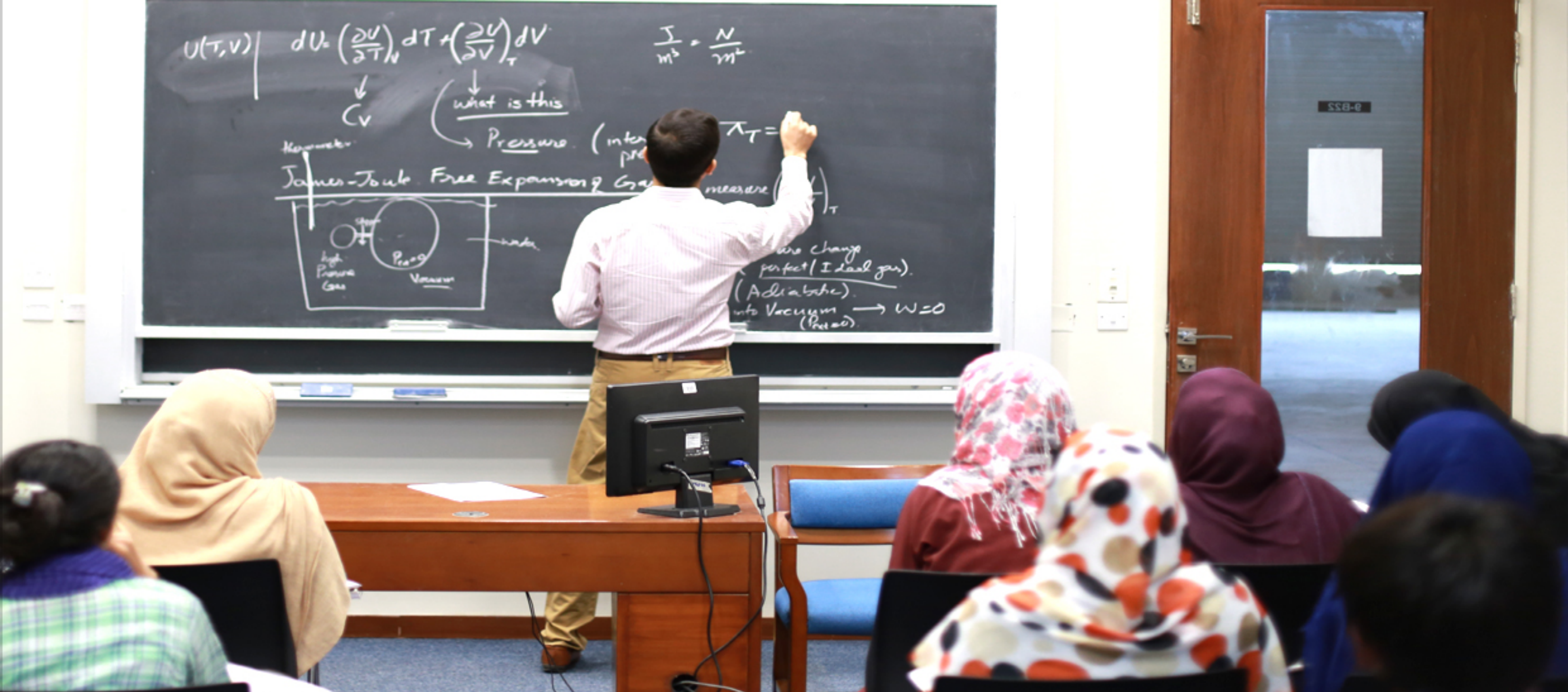
**SCIENTIFIC COMPUTATION**  
DR. SULTAN SIAL  
DR. AMER RASHEED  
DR. MUDASSAR RAZZAQ  
DR. ZAHRA LAKDAWALA

**FLUID STRUCTURE  
INTERACTION OPTIMISATION**  
DR. MUDASSAR RAZZAQ

**OPERATOR THEORY**  
DR. MASOOD HUSSAIN SHAH

**ALGEBRAIC GEOMETRY**  
DR. SHAHEEN NAZIR





## HOW WILL MATHEMATICS HELP YOU REALISE YOUR AMBITION?

The Department of Mathematics houses:

- Research Labs working in the area of Financial Mathematics, Stochastic Portfolio, Spectral Theory, Mathematical Analysis, Algebraic Geometry, Scientific Computation, Evolution Equations, Operator Theory and Algebraic Topology.
- A 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.

## EMBRACE THE MATHEMATICS EXPERIENCE

- PhD scholar, Abdul Quayam Khan was selected for an exchange programme by the Higher Education Commission, Pakistan under their International Research Support Initiative Programme from September 1, 2019 to January 31, 2020. His research focused on computational fluid mechanics, numerical methods and analysis for partial differential equations and applications, numerical simulations of free boundary value problems, and problems on irregular domains with application to oil industry.
- Recent PhD graduate, Burhan ul Haq was appointed Assistant Professor in the Department of Mathematics at the Forman Christian College, Lahore.
- PhD Mathematics student, Saba Irum was awarded the Pakistan Scottish PhD Travel Grant by the British Council to conduct her research at a Scottish university. The Grant aims to facilitate female PhD students to carry out research in Scotland. Ms. Irum, under the supervision of Dr. Imran Naeem, worked on analytical solutions of differential equations. She joined Dr. Gabriel R. Barrenechea at the University of Strathclyde in Scotland to develop and analyse a mathematical model of cancer invasion for the detection of an optimal drug dosage scheme.



### DR. MUHAMMAD SABIEH ANWAR

Dean and Professor, Syed Babar Ali School of Science and Engineering

“The graduate programmes in science and engineering at SBASSE, LUMS 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 more 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

Applicants must meet the minimum eligibility criteria in order to be considered for admission to the Graduate Programmes.

#### MS Programme

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

- Academic Record
- Performance in Admission Tests\*
- Application Review
- Interview Performance (If shortlisted)
- Submission of complete online application, application processing fee and online supporting documents by the stipulated deadline

#### PhD Programme

- Academic Record
- Performance in Admission Tests\*
- Application Review
- Research Statement
- Submission of complete online application, application processing fee and online supporting documents by the stipulated deadline
- 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 criterion does not guarantee admission to LUMS.

\*We are aware that the current COVID-19 crisis poses difficulties for applicants to submit GRE test scores. Under the circumstances, you may apply to the MS/PhD Mathematics Programme without the test scores being submitted (if you have not taken the test yet). You may submit your applications without the GRE scores provided all other application components are complete upon submission.

If no GRE is scheduled due to the closure of test centres by March 30, 2021, LUMS will process applications using the available information. If shortlisted, you may then be asked to appear for an interview followed by a conditional acceptance if you are successful. Once, test centres are functioning, you will need to sit for the test and attain the minimum test score required by the University.

#### Performance in Admission Tests

Applicants to the MS/PhD Programme in Mathematics are required to take the **LUMS Graduate Admission Test (LGAT)**, which is comprised of quantitative, verbal, and analytical sections. In addition, applicants are required to take the **SBASSE Subject Test** in Mathematics.



#### DR. HANIYA AZAM

Assistant Professor and Interim Chair, Department of Mathematics

“The graduate programmes at the Mathematics department boast a dedicated faculty actively pursuing research in diverse areas of contemporary Mathematics. As the divide between the Pure and the Applied Mathematics blurs, we have crafted our courses to ensure a balance between theoretical and applied facets of all subjects we teach. Every graduate student we admit benefits from the rigour of our graduate courses as well as a hands-on experience of scholarship and research in Mathematics. Our faculty and students together have established a culture which enables the pursuit of excellence at the department and beyond.”



## Exemption for Applicants Who Have Taken Graduate Record Examination (GRE) Tests

- Applicants who have taken the **Graduate Record Examination (GRE) General Test** through the Educational Testing Service (ETS), USA during the last two years (i.e. after April 11, 2019) and obtained an aggregate score of **300** in the **quantitative** and **verbal** sections may choose not to take the LGAT.
- Applicants who have taken the **GRE Subject Test in Mathematics** through ETS, USA during the last two years (i.e. after April 11, 2019) and obtained a score at the 60th percentile or above may choose not to take the SBASSE Subject Test in Mathematics.

## International Applicants

Applicants residing outside Pakistan are required to take the **GRE General Test** as well as the **GRE Subject Test in Mathematics** through the Educational Testing Service, ETS USA. For further information, please visit [www.ets.org](http://www.ets.org)

### Note:

LGAT and SBASSE Subject Test Scores will be valid only for one academic year. The LGAT and SBASSE Subject Test scores will be used for application evaluation, hence, will not be disclosed to the applicants.

## International Students

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)

## 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 for MS programmes
- Partial tuition fee waivers for all MS Basic Sciences and Mathematics students
- LUMS Interest Free Loan (only for local applicants)
- External Scholarships (support and eligibility for these scholarships vary depending on the donor)
- 100% Scholarships (tuition, registration, admission, and a stipend) for PhD students for 4 years
- HEC Research Grants
- Options to work as Research or Teaching Assistants (subject to availability)

For details, please visit

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



**MARIA NADEEM**  
MS Mathematics 2018

“As an MS student at SBASSE, you get to avail great research and learning opportunities guided by highly qualified and supportive instructors. Through the ample resources and links that the School has with different universities abroad, you get to equip yourself with all the skills you need for your graduate studies. I personally had a wonderful experience and would highly recommend the MS Mathematics programme offered at SBASSE to prospective students.”



# DATES TO REMEMBER

DEADLINE TO APPLY  
**MARCH 30, 2021**  
5:00 PM (PKT)

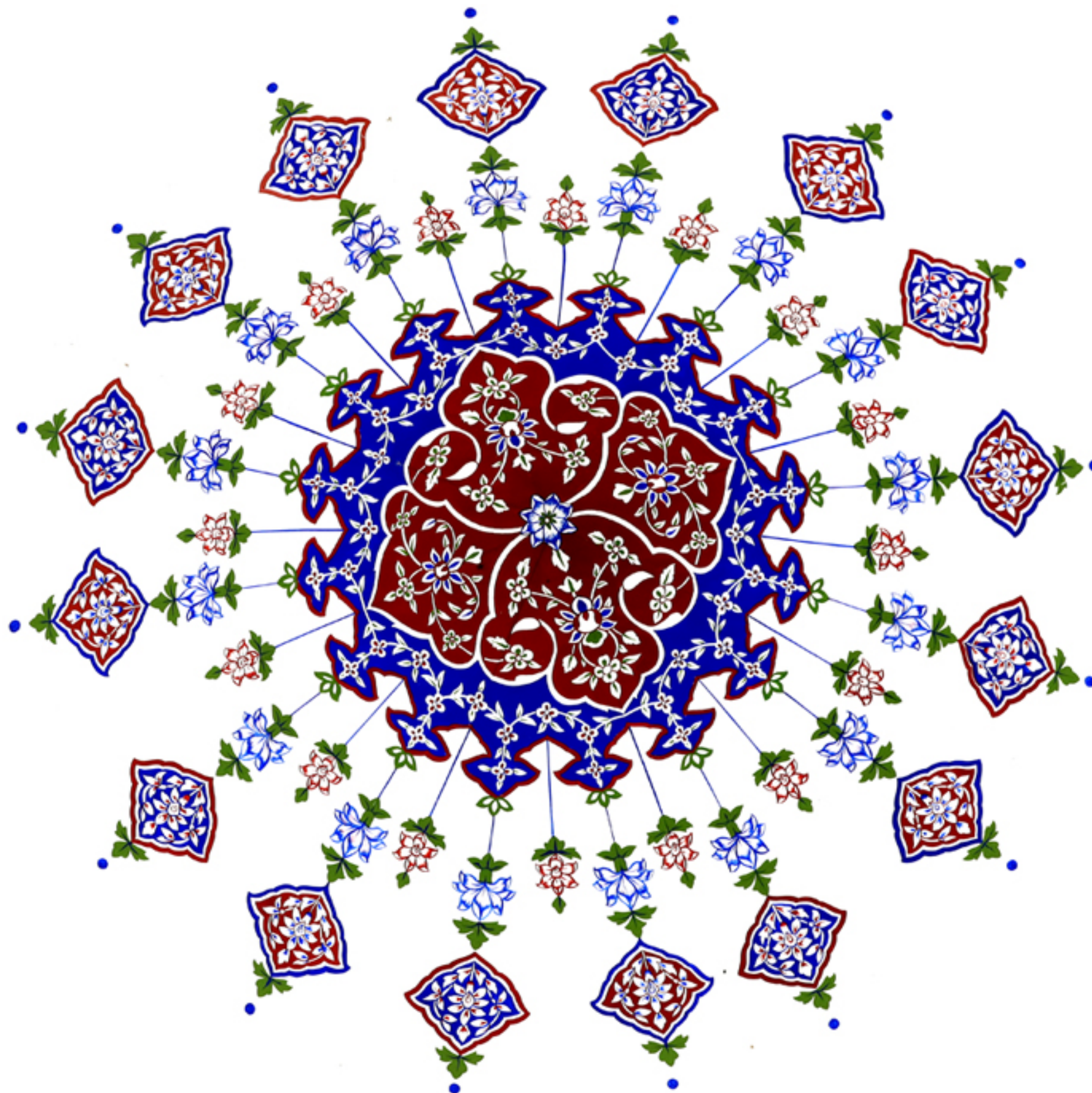
DEADLINE TO SUBMIT ONLINE  
SUPPORTING DOCUMENTS  
**APRIL 02, 2021**

LGAT & SBASSE  
SUBJECT TEST  
**APRIL 11, 2021**

DEADLINE TO APPLY FOR LUMS  
CONTINUING STUDENTS  
**MARCH 30, 2021**  
5:00 PM (PKT)

DEADLINE TO TAKE GRE  
**APRIL 11, 2021**

ADMISSION DECISIONS  
**JUNE 15 - JULY 31, 2021**



## LUMS

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Website: [www.lums.edu.pk](http://www.lums.edu.pk)



#LearningWithoutBorders  
#MeritMatters