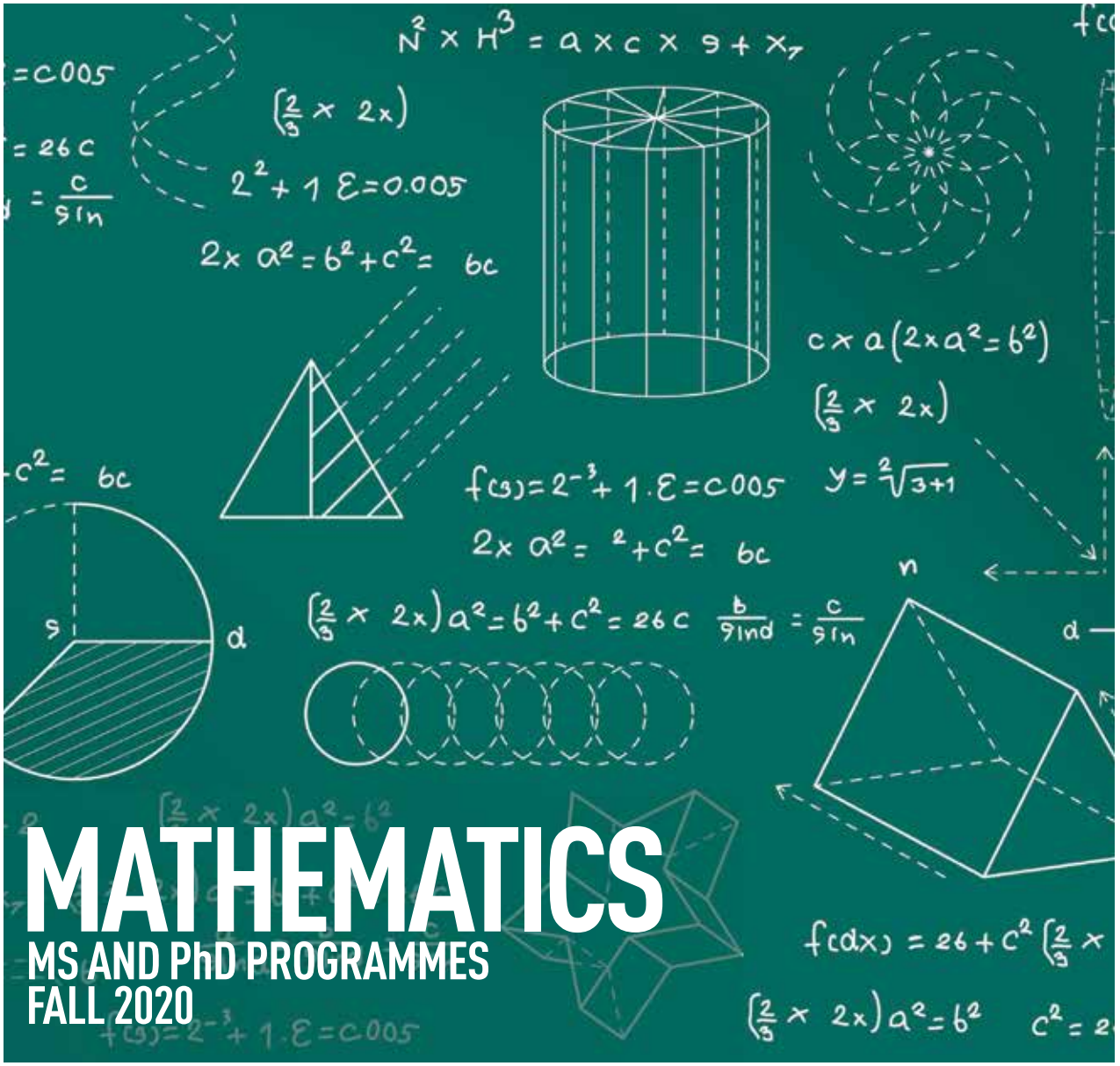
LUMS
A Not-for-Profit University

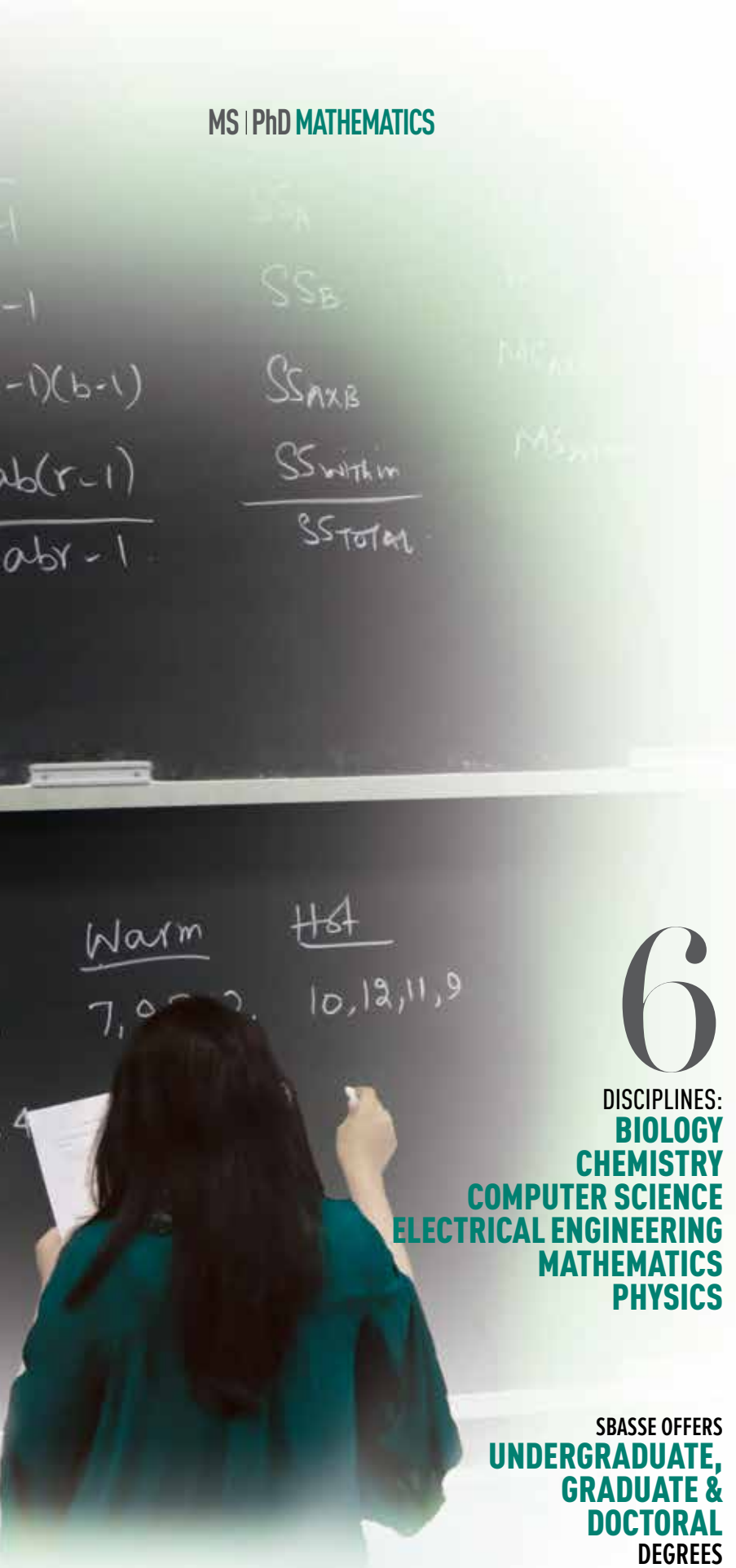
SYED BABAR ALI SCHOOL OF SCIENCE AND ENGINEERING



MATHEMATICS

MS AND PhD PROGRAMMES
FALL 2020

RESEARCH
INNOVATE
IMPACT



CREATING A BETTER WORLD
WITH LUMS SBASSE

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 carry out world-class, multidisciplinary research.

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 the rest from a 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 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.

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DISCIPLINES:
BIOLOGY
CHEMISTRY
COMPUTER SCIENCE
ELECTRICAL ENGINEERING
MATHEMATICS
PHYSICS

SBASSE OFFERS
UNDERGRADUATE, GRADUATE & DOCTORAL
DEGREES

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.

TOP-QUALITY PUBLICATIONS

The research conducted by graduate students has been published in top-quality, renowned journals including:

- 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 Publishing Group
- Royal Society of Chemistry
- Journal of Computational and Applied Mathematics

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.

COLLABORATIONS WITH NATIONAL AND INTERNATIONAL INSTITUTES

- **Institute of Electronics and Telecommunications of Rennes, France**
- **Singapore University of Technology and Design, Singapore**
- **CentraleSupélec, France**
- **Texas A&M University, Qatar**
- **NUST School of Electrical Engineering and Computer Science, Pakistan**

OUR PLACEMENTS

Top academic placements (Massachusetts Institute of Technology, University of Warwick, London School of Economics, University of Oxford, University of Cambridge etc.)

Our graduates are hired by top local and international organisations (Engro Corporation, Nestle Pakistan, Systems Ltd., Microsoft, Google, Facebook etc.)

64% of the 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.

MS | PhD MATHEMATICS

QUICK FACTS

64%
graduates placed on jobs

80+
highly qualified faculty members

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.

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

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. Mudassar 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

FLUID STRUCTURE INTERACTION OPTIMISATION
Dr. Mudassar Razzaq

DR. SHAHID MASUD

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

"Our multifaceted 21st century curriculum provides students 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 sectors 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."

HOW WILL SBASSE 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.

DR. IMRAN NAEEM

Associate Professor and Chair, Department of Mathematics

"One of the hallmarks of the Department of Mathematics at LUMS is its commitment to research which provides students an opportunity to become apprentice mathematicians. Students joining our graduate community can expect to be immersed in a rigorous degree programme that will quickly move them to the frontiers of real world mathematical challenges. Our faculty has a diverse set of experiences and shall continue striving for excellence in core research areas, which include differential equations, numerical analysis, optimisation, probability theory, mathematical biology and others. If you are eager to work with a dynamic group of faculty and students, and if you are motivated and ready for the challenges of mathematical study, then LUMS is a perfect place to explore a degree in mathematics."

EMBRACE THE SBASSE EXPERIENCE

- Dr. Ihsan Ayyub Qazi, Associate Professor of Computer Science at SBASSE and Dr. Ayesha Ali, Assistant Professor of Economics at Mushtaq Ahmad Gurmani School of Humanities and Social Sciences, won the highly competitive Facebook Integrity Foundational Research Award worth USD 50,000 for their proposal, 'Understanding the Impact of Digital Literacy on Misinformation in Pakistan.'

- The International Commission for Optics and the Abdus Salam International Centre for Theoretical Physics declared Dr. Muhammad Faryad, Assistant Professor, Department of Physics, as winner of the 2019 Gallieno Denardo Award, for his contributions to Optics research and education.

- Dr. Shaper Mirza, Associate Professor of Biology won The Shahid Hussain Foundation's Public Health Research Grant 2018 worth PKR 1 million.

- Two PhD Chemistry students—Iqra Azeem and Asma Gilane were awarded the Commonwealth Split-site PhD scholarships to spend a year at UK universities.

- Junaid Saif Khan, MS Physics 2018 was selected for the 69th Lindau Nobel Laureate Meeting in Lindau, Germany.

- LUMS Energy Institute carried out the power demand and supply analysis for Pakistan for the years 2018-2030.

- Tariq Lab at LUMS has discovered over 200 new genes that are involved in the maintenance of cell identities. These results will have a direct implication in the field of cancer biology and regenerative medicine.

- The LUMS Biomechanics Lab, a centre to test bowling actions, has now been accredited by the International Cricket Council, making it the fifth in the world to earn this accolade.

RIZWAN KHALID

MS Mathematics 2016

"As an MS student at LUMS, you get excellent support and advice from your supervisors. SBASSE has very good industrial connections and international links, and in collaboration with the vast resources at LUMS, you get everything you need for your graduate studies including opportunities to go abroad for higher studies or to attend conferences. I would highly recommend the graduate programme in Mathematics to prospective students."

YOUR JOURNEY BEGINS HERE!

ADMISSION PROCESS FOR LOCAL AND INTERNATIONAL STUDENTS

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

- Academic record
- Admission test performance
- Submission of completed application form and supporting documents by the stipulated deadline
- Interview performance (if called)

For details, visit:
https://admission.lums.edu.pk/graduate-programmes

TESTING DETAILS

Local Applicants

Applicants to the MS/PhD Programme in Mathematics are required to take the following two (2) admission tests in order to be considered for Fall 2020 admission:

1. LUMS Graduate Admission Test (LGAT); and
2. LUMS SBASSE Subject Test in Mathematics

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

- Applicants who have taken the Graduate Record Examination (GRE) General Test (through the Educational Testing Service (ETS), USA) during last two (2) years (i.e. after April 01, 2018) 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 the Educational Testing Service (ETS), USA) during last two years (i.e. after April 01, 2018) 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 following two (2) admission tests in order to be considered for Fall 2020 admission:

1. GRE - General Test; and
2. GRE - Subject Test in Mathematics

For GRE registration, please visit
www.ets.org

NOTE

- LUMS Graduate Admission Test (LGAT) is comprised of Quantitative, Verbal, and Analytical sections.
- The LUMS Graduate Admission Test (LGAT) and the SBASSE Subject Test in Mathematics for Fall 2020 admission will be held ONLY ONCE on April 12, 2020.
- LGAT and SBASSE Subject Test Scores will be valid only for one (1) academic year.
- The LGAT and SBASSE Subject Test scores will be used for application evaluation, hence will not be disclosed to applicants.

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/ms-programme-grad-fa**

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**

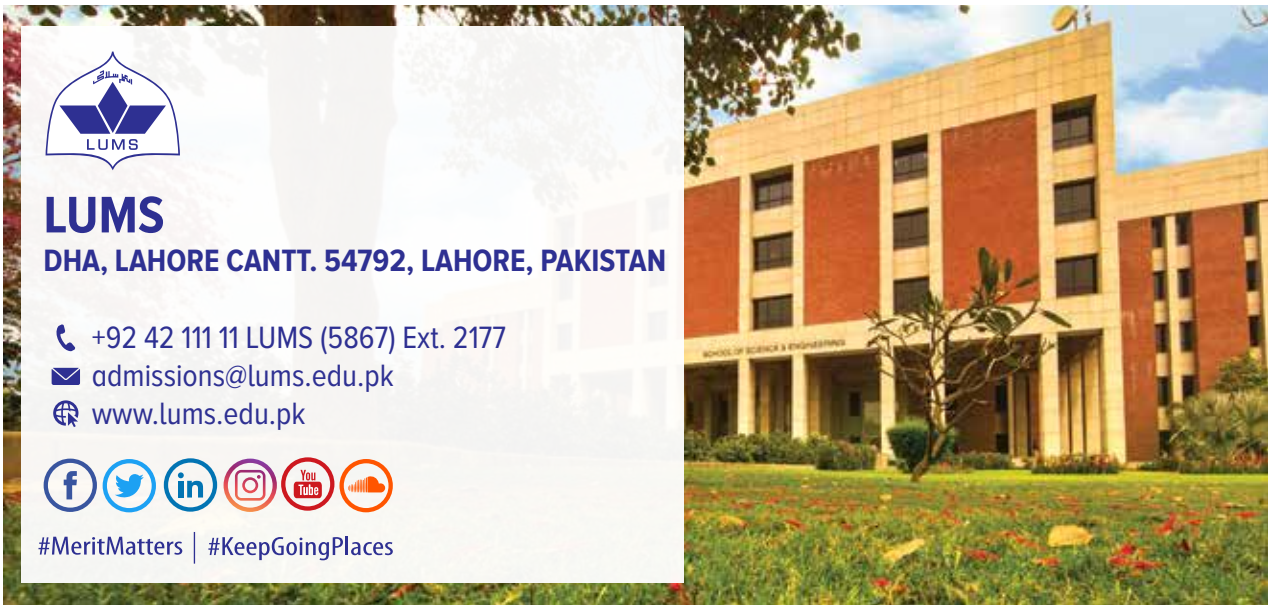
DATES TO REMEMBER

DEADLINE TO APPLY
APRIL 1, 2020
5:00 pm (PKT)

DEADLINE TO APPLY FOR LUMS UG CONTINUING STUDENTS
APRIL 1, 2020 5:00 pm (PKT)

ADMISSION DECISIONS
JUNE - JULY 2020

LGAT & SBASSE SUBJECT TEST
APRIL 12, 2020

DEADLINE TO TAKE GRE (GENERAL)
APRIL 12, 2020

COMMENCEMENT OF CLASSES
SEPTEMBER 2020