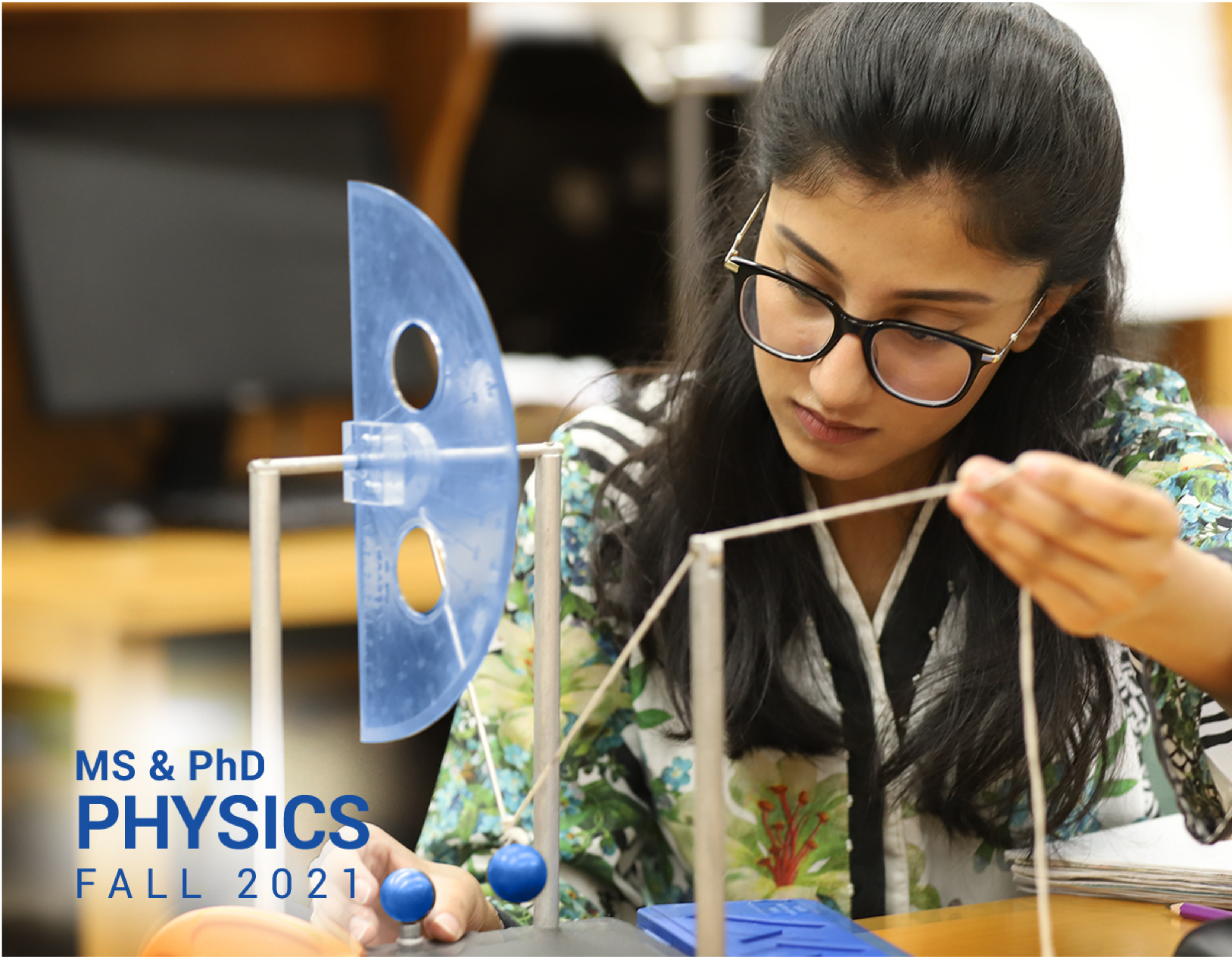


SYED BABAR ALI SCHOOL OF SCIENCE AND ENGINEERING

A young woman with long dark hair and glasses is focused on a physics experiment. She is wearing a colorful floral patterned shirt. The experiment setup includes a metal stand with a blue semi-circular plate attached to it. A string is draped over the plate, and she is holding one end of the string. Two blue spheres are suspended from the string. The background is a blurred laboratory or classroom setting.

**MS & PhD
PHYSICS**
FALL 2021

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 etc.)
- Our graduates are hired by top local and international organisations (Engro Corporation, Nestle Pakistan, Systems Ltd., Microsoft, Google, Facebook etc.)
- 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
- 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 Journals
- Journal of Computational and Applied Mathematics

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

MS | PhD PHYSICS

HOW WILL YOU LAUNCH YOUR NEW WORLD?

The Department of Physics 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, Quantum Field Theory and Particle Physics Phenomenology, 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 as well as distinguished speakers from outside LUMS, and provide a chance to keep abreast of cutting edge and high impact research.

QUICK FACTS

- STUDENTS ARE HEAVILY INVOLVED IN RESEARCH IN VARIOUS AREAS OF PHYSICS
- A WIDE RANGE OF ELECTIVE COURSES ARE OFFERED

WHAT WILL YOUR NEW WORLD INVENT?

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

SPIN AND PHOTON PHYSICS

Dr. Muhammad Sabieh Anwar

SOLAR CELLS AND OPTOELECTRONICS

Dr. Ammar Ahmed Khan

COSMOLOGY AND GENERAL RELATIVITY

Dr. Syed Moez Hassan

QUANTUM DYNAMICS

Dr. Adam Zaman Chaudhry

QUANTUM OPTICS

Dr. Ata Ulhaq

HIGH ENERGY PHENOMENOLOGY

Dr. Rizwan Khalid

PLASMONICS AND NANOENGINEERED MATERIALS

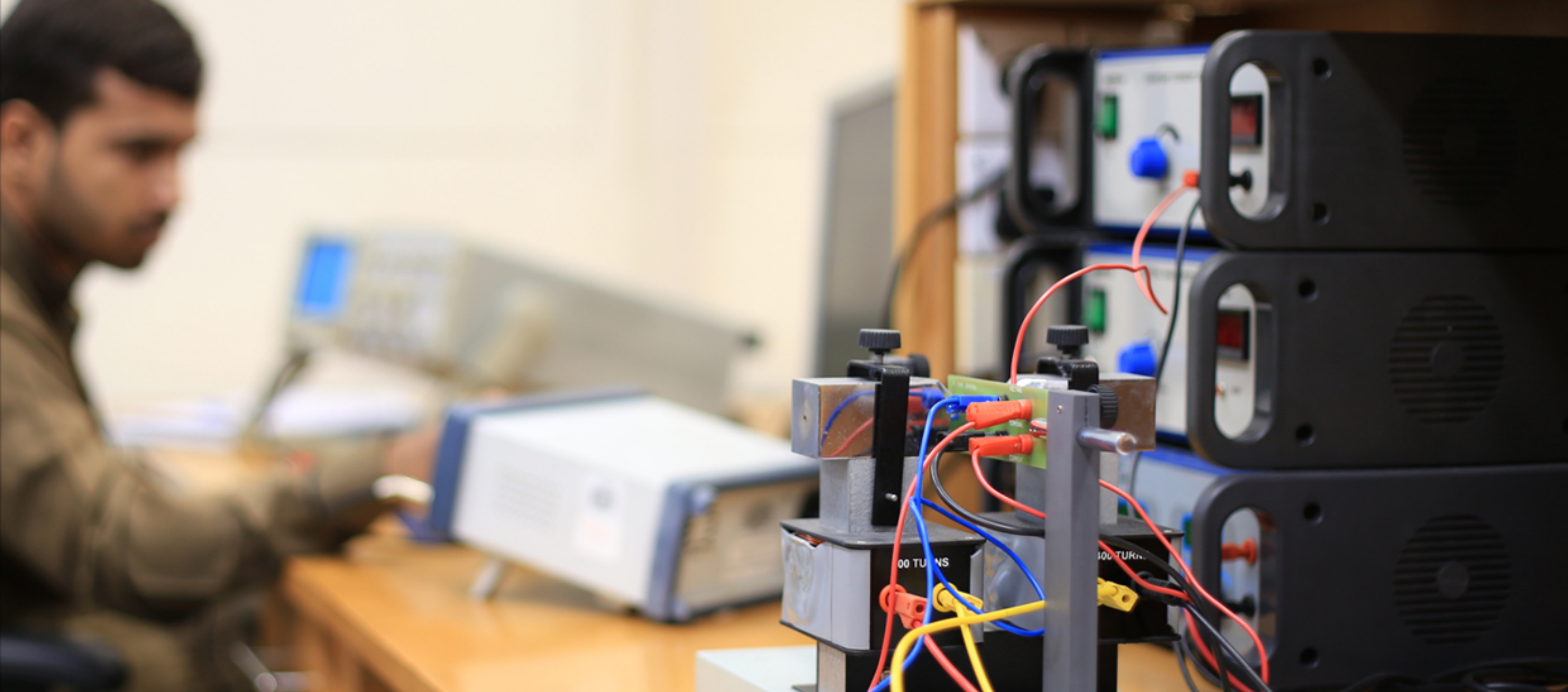
Dr. Muhammad Faryad

QUANTUM FIELD THEORY

Dr. Tajdar Mufti

CONDENSED MATTER THEORY

Dr. Rafi Ullah



HOW WILL PHYSICS HELP YOU REALISE YOUR AMBITION?

The Department of Physics houses:

- Laboratories in Solid State Physics, Nanoscience, Optics and Photonics, Radiation Physics and Measurement and Instrumentation
- Home-grown facilities in diverse areas of Physics including synthesis of new materials, cryogenic and high temperature transport, electrical, thermal and magnetic property measurements, homebuilt atomic force microscopy and magnetic resonance devices
- A wide range of experimental facilities in optics like optical spectroscopy, optical and Kerr microscopy, sensitive imaging, light modulation, radiation detection, X-ray fluorescence, quantum optics, single photon detection, electrodeposition, electrospinning, sputter coating, and high-speed electronic test and measurement equipment
- Research groups headed by various faculty members aiming to explore various fields

EMBRACE THE PHYSICS EXPERIENCE

- 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.
- Junaid Saif Khan, MS Physics 2018 was selected for the 69th Lindau Nobel Laureate Meeting in Lindau, Germany.
- Physics PhD student, Aamir Hayat published his research on radiation in hyperbolic media in the prestigious journal, *Physical Review A*.



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 criteria 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 Physics 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 Physics 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 Physics.



DR. MUHAMMAD FARYAD
Assistant Professor and Chair, Department of Physics

“ The Physics Department at SBASSE has an outstanding teaching and research environment where our students can relish this relentless quest for an appreciation of our material surroundings and assist in our goal of enhancing the country's and region's intellectual, economic and material capital. At the Physics Department, the thrust is interdisciplinary, the focus is on strong mathematical and physical basics as well as a keen appreciation of applications. Through a rigorous curriculum taught by an exciting group of people, hailing from diverse training in particle physics, quantum gravity, spintronics, optics, and condensed matter physics, and supported by modern, state-of-the-art experimental facilities, we enrich our students' learning experience. ”

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 Physics** 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 Physics.

International Applicants

Applicants residing outside Pakistan are required to take the **GRE General Test** as well as the **GRE Subject Test in Physics** through ETS, USA. For further information, please visit 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

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>



SYED HASSAN ABBAS BUKHARI

MS Physics 2020

“If you have an intense curiosity about how the world works at a fundamental level, then Physics is the discipline for you! Whether it be understanding the expansion of space-time and the history of our universe, or exploring the atomic world's strange and quirky behaviour, Physics gives us a powerful tool to model and describe these systems. The state-of-the-art Physlab has the perfect professional work environment for researchers and students. I worked on the open quantum system and learnt many things from the dual nature of matter to how to run a real quantum computer—precisely how we can make it more reliable for humanity.”

DATES TO REMEMBER

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

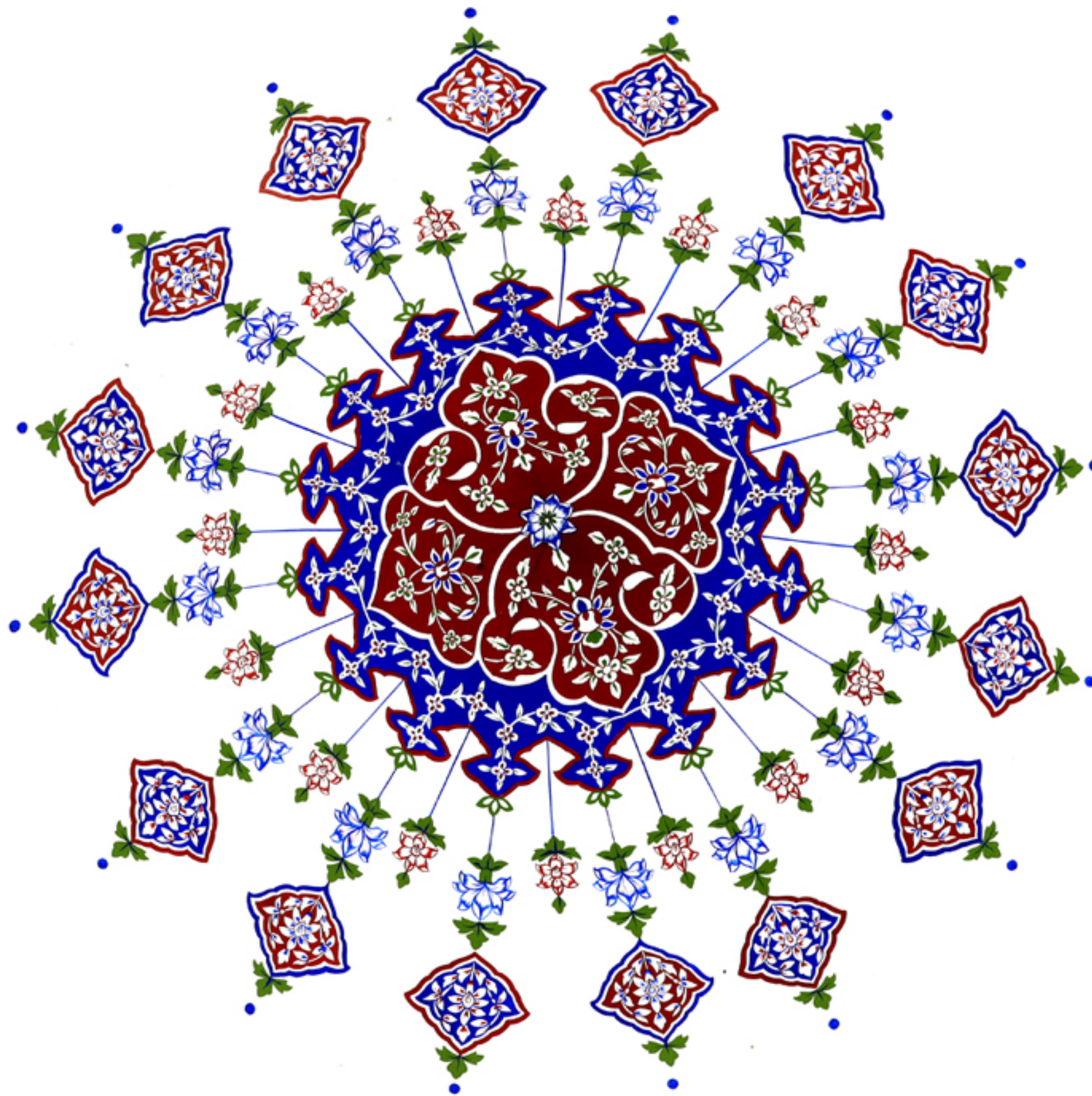
DEADLINE TO SUBMIT ONLINE
SUPPORTING DOCUMENTS
APRIL 02, 2021

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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Ph: +92 42 111 11 LUMS (5867) Ext. 2177
Email: admissions@lums.edu.pk
Website: www.lums.edu.pk



#LearningWithoutBorders
#MeritMatters