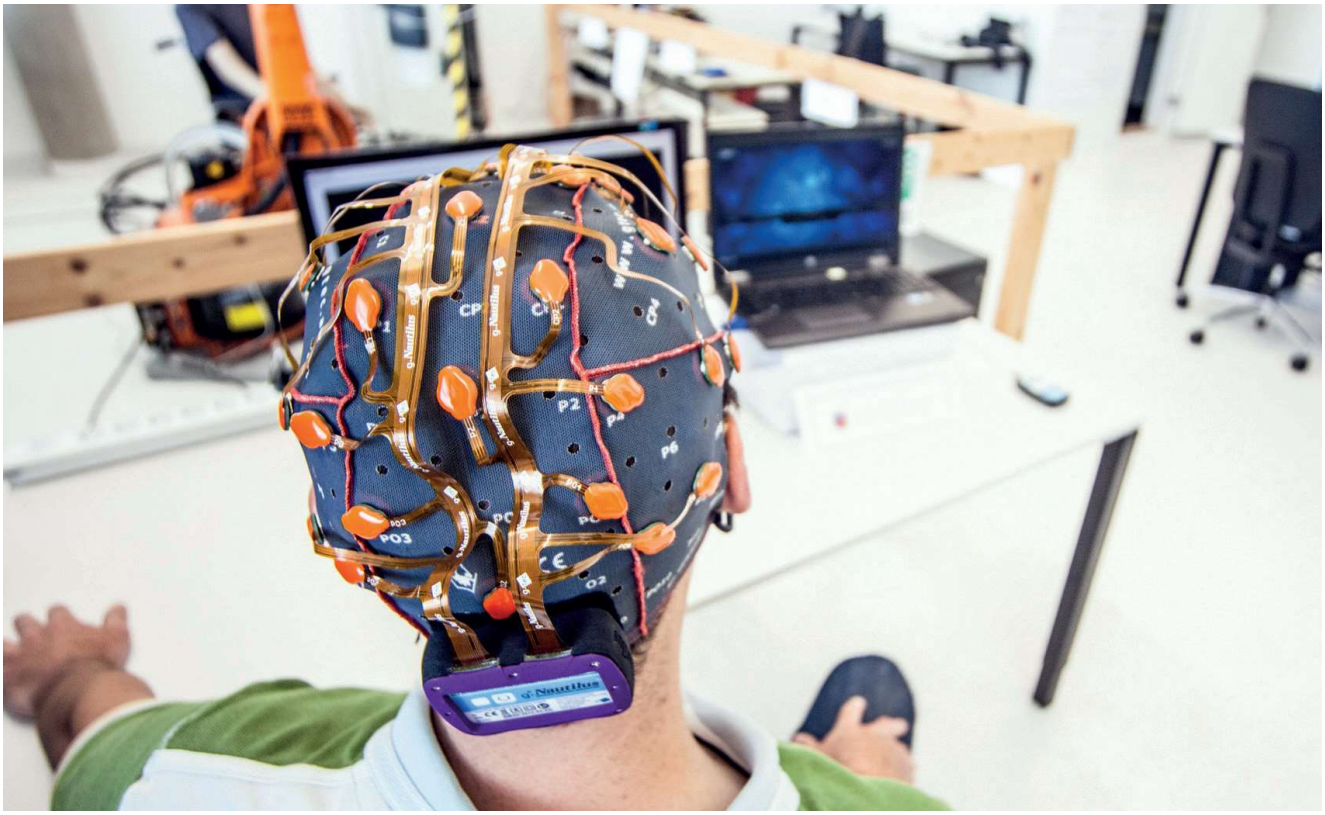
PhD Biomedical Engineering Program

The PhD Biomedical Engineering program is offered as per guidelines of Higher Education Commission (HEC). The desirous candidates for PhD program must possess 18 years MS degree with a minimum CPGA of 3.00 out of 4.00. The program comprises 20 credit hours of coursework and 30 credit hours of research and doctorate dissertation. The courses can be selected in consultation with the PhD supervisor from the list of graduate courses.

The completion of coursework is followed by a comprehensive examination for granting PhD candidacy. The PhD dissertation is evaluated by two experts of technologically advanced countries and one local expert. Subsequent to positive evaluation from these experts, the PhD scholar is required to undertake an open defence to fulfil the degree requirements. A minimum residency of three years at the university campus and publishing at least two research papers in an impact factor journal of good repute is also an essential requirement to earn a PhD degree.



Eligibility Criteria

MS in Biomedical / relevant Engineering Fields or equivalent
OR
MBBS / Equivalent allied sciences degree with a minimum CGPA of 3.00 on a 4.00 scale or equivalent.

Duration:

Minimum 3 years & Maximum 8 years

Interview:

The Interview will be conducted to finalize the admission to the subject discipline.

Degree Requirements:

- Minimum credit hours: 20 credit hours of course work and 30 Cr. Hr. of research.
- The candidates are required to get a minimum CGPA of 3.00.

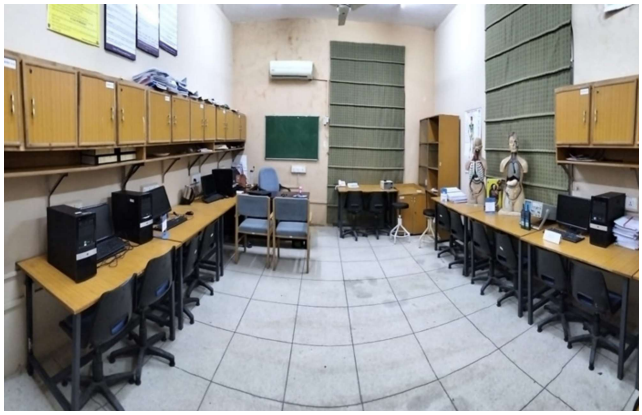
Selection Criteria:

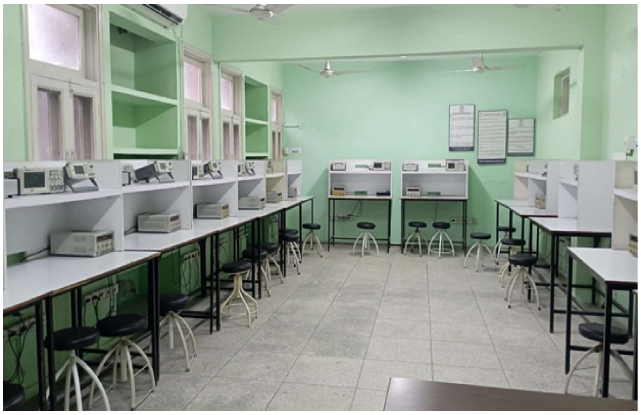
GRE (Subject)/NTS (Subject)/FEAS Test and interview.

List of Courses

Code	Subject	Cr. Hours
UR- 7110	Ethics in Practice I	1 + 0
UR- 7120	Ethics in Practice II	1 + 0
BM-7000	Biology for Engineers* (Non Credit Course)	3 + 0
BM-7010	Applied Mathematics and Basic Electronics** (Non Credit Course)	3 + 0
BM-7020	Systems Physiology	3 + 0
BM-7110	Cell and Molecular Biology	3 + 0
BM-7120	Molecular Biology	3 + 0
BM-8030	Advanced Biomedical Instrumentation	3 + 0
BM-8130	Biomedical Engineering Systems	3 + 0
BM-8140	Ultrasonic Instrumentation & Imaging	3 + 0
BM-8150	Real Time Systems Design& Applications	3 + 0
BM-8040	Advanced Medical Imaging	3 + 0
BM-8050	Advanced Biomedical Control Systems	3 + 0
BM-8060	Biomedical Devices Design	3 + 0
BM-8070	Selected Topics in Biomedical Engineering	3 + 0
BM-8080	Advance Biomedical Signal Processing	3 + 0
BM-8180	Advanced Biomedical Signals & Systems	3 + 0
BM-8090	Advanced Biomedical Image Processing	3 + 0
BM-8001	Machine Learning	3 + 0
BM-8101	Pattern Recognition	3 + 0
BM-8111	Neuralengineering	3 + 0
BM-8011	Biomedical Sensors	3 + 0
BM-8121	Medical Microsystems	3 + 0

Code	Subject	Cr. Hours
BM-8021	Advanced Biomechanics	3 + 0
BM-8031	Biomedical Optics and Lasers	3 + 0
BM-8041	Advanced Biofluid Mechanics	3 + 0
BM-8051	Nano Biotechnologies	3 + 0
BM-8151	Advanced Techniques in Biotechnology	3 + 0
BM-8061	Modeling & Simulation of Physiological Systems	3 + 0
BM-8071	Brain Computer Interface	3 + 0
BM-8081	Human Computer Interaction	3 + 0
BM-8091	Operations Management	3 + 0
BM-8002	Research Methodology	3 + 0
BM-8012	Advanced Rehabilitation Engineering	3 + 0
BM-8022	Advanced Biomedical Robotics	3 + 0
BM-8032	Biomedical Microprocessor and Interfacing	3 + 0
BM-8132	Embedded Systems & Applications	3 + 0
BM-8042	Advanced Digital Design	3 + 0
BM-8052	Biomaterial Science & Engineering	3 + 0
BM-8152	Advanced Biomaterials	3 + 0
BM-8162	Biomaterials and Drug Delivery	3 + 0
BM-8172	Advances in Tissue Engineering	3 + 0
BM-8062	Telemedicine System	3 + 0
BM-8072	Medical Informatics	3 + 0
BM-8082	Biostatistics	3 + 0
BM-8100	PhD Thesis	30 + 0





RESEARCH GROUPS (BIOMEDICAL ENGINEERING)

BIOSIGNAL PROCESSING

Team Lead: Dr. Faraz Akram

Members: Muhammad Zia Ur Rehman, Hamza Toor, Falak Anjum, Shakeel Ishtiaq, Abdul Qadeer Khan

Working: The Bio-Signal Processing group at Riphah International University investigates the use of signal processing and machine learning techniques for the analysis and classification of biomedical signals, with special emphasis on EEG, EMG, and ECG signals.

Currently, the group is engaged in the following research projects.

- EEG based Brain-Computer Interfaces
- Design and Development of EMG Controlled Prosthetics
- Stress Detection using Pulse Rate Variability
- Non-invasive blood glucose monitoring

BIOMEDICAL INSTRUMENTATION

Team Lead: Hamza Toor

Members: Mashal Fatima, Mudassir Hussain, Shoaib zafar, Syeda Rida Zahra

Working: Biomedical instrumentation covers the area of design and development of devices that can detect and measure the physical quantity present in the body.

Currently work on following research projects is being carried out:

- Development of Smart Stick for visually impaired people
- Designing and Fabrication of a low-cost Computer aided auscultation device for developing countries
- Fall Detection Using wearable 3 axis accelerometer
- Designing and fabrication of EEG Measurement system using Gold Electrodes

BIOMECHANICS

Team Lead: Dr. Muhammad Zia Ur Rehman

Members: Faisal Amin, Ayub Khan, Dr. Sara Rehman, Shoaib Zafar, Abdul Malik Muhammad

Working: Biomechanics is the study and application of physical laws on living organisms. It includes ergonomics, orthopedic biomechanics, sports mechanics, rehabilitation mechanics etc. The group of biomechanics has been involved in several research projects and led to publish numerous conference and journal articles of international repute. The titles of main ongoing projects are given below:

- Footwear Affects Biomechanical Work and Knee Adduction Moment during Stance Phase in Medial Knee Osteoarthritic Male Pakistani Adults
- Pushing a Manual Wheelchair Requires More Muscular Force than Pulling
- Effect of toe-out and toe-in postures on static standing balance
- Effect of bunion on plantar pressure distribution

MEDICAL IMAGE PROCESSING

Team Lead: Dr. Jawwad Sami Ur Rahman

Members: Muddasir Hussain, Falak Anjum and Abdul Malik.

Working: Image Processing group aims to apply medical image segmentation techniques on the raw data of MRI to extract meaningful information to help the doctors in the diagnosis process.

- Development of Deep Learning method for tumor analysis in medical images.
- Use of Electron Microscopy images for the analysis of malignant cancer.