NED University of Engineering & Technology

Ph.D. Programme
Prospectus 2016
FOREWORD

NED University of Engineering & Technology is one of the two oldest engineering institutions in Pakistan and well known throughout the world in engineering education. It consistently endeavours for quality of teaching and research. Having a long history of engineering education, the University is committed to its future growth and development and believes in establishing environment conducive to continual improvement in its efforts for providing the highest level of quality engineering education.

The aim of this programme is to create high quality valued human capital capable of changing the research environment in the country and at the same time compete with the emerging world leaders in research and innovation. This programme is designed to provide our students with state of the art analytical, design and computing skills that underpin modern engineering practices, while encouraging the creativity and problem-solving skills that are so important for a good engineer. The courses aim at producing engineers both for local and global market.

We believe in training our graduates to be leaders both technically and ethically and emphasize multidisciplinary activities in education, service and research. We maintain a friendly, supportive and diverse environment that encourages our faculty and students to achieve their best, which is aptly provided in the quality policy which is strictly adhered to.

This prospectus provides necessary information to all the aspirants who wish to seek admission in the PhD programmes in various engineering and non-engineering disciplines.

Prof. Dr. M. AfzalHaque
Vice-Chancellor
1. GENERAL INFORMATION

1.1 HISTORICAL BACKGROUND OF THE UNIVERSITY

The NED University of Engineering & Technology was established in March 1977 under an act of the Provincial Assembly of Sindh after upgrading of the former NED Government Engineering College, which was set up in 1922. The NED University is thus one of the oldest institutions in Pakistan for teaching and producing engineering graduates. Prior to this, the D.J. Sindh College used to run classes to train subordinates for the Sindh P.W.D., the Municipalities and Local Boards.

On August 29, 1921 College Principal CS Shahani made a concerted effort to get Engineering Degree classes started to meet demands of Civil Engineers on the project for completion of the Sukkur Barrage. Application to this effect was made to the University of Bombay through the Commissioner of Sindh, who was ex-officio president of Sindh Collegiate Association (a registered society of subscribers for providing higher education in Sindh). The Bombay University however rejected the application on the grounds of insufficient finance and insisted on entirely separate buildings, laboratories for the engineering college as a separate institution. After collection of donations from the Puribai and Becharbai Trust, Vishandas Fatehchand Brothers and one huge donation (for that time) of Rs. 150,000 from Mr. Nadirshaw Edulji Dinshaw, the new college buildings and laboratories were constructed on separate land. The new college was originally the Prince of Wales Engineering College but later renamed in memory of Nadirshaw Edulji Dinshaw. The NED College was provisionally granted affiliation on 23-05-1923 by the University of Bombay for the first and second year courses in Civil Engineering and 78 students were provisionally admitted into first year classes in 1922. Permanent affiliation followed in February 1927.

The first-full time Principal of NED Engineering College was Mr. GN Gokhale who joined on 1st July 1923. Prior to this, Rai Sahib Bhupatrai had acted as Honorary Principal. The first professor (and Vice Principal) was Mr. SB Jannarkar who, along with Mr. Gokhale, did all the spadework in organizing and equipping the various departments and ordering the equipment for the Power House, Boiler Room, Hydraulics Laboratory, Engine Room and Machine Shops.

The original NED Engineering College was housed in four blocks of buildings and two sheds. The main block was named as Seth Fatehchand Dewandas Khilnani Hall. The block housing the Power House, Electrical and Hydraulics Laboratories, and Workshops was named after Bai Puribai and Bacharbai. Further additions were made to this block to provide accommodation for the Machine Shop on the ground floor and a (Mechanical) Drawing Hall on the first floor. The fourth block, completed in 1945, contained a Classroom and Clerk’s Office on the ground floor and another (Civil) Drawing Hall on the first floor.

Two sheds were also built, one to house the Carpentry and Smithy Shops, and the other, alongside the Electrical Laboratory and Engine Room, to train technicians. The total cost of the buildings was just over Rs. 265,000 and the cost of equipment (including machinery, electrical instruments; models, steam, gas and oil engines; surveying and levelling instruments), books and furniture was just under Rs. 400,000.

The college remained affiliated to the University of Bombay from its inception in 1922 to 1947, after which it was taken over by the Government of Sindh; renamed as NED Government Engineering College and affiliated to the University of Sindh. After establishment of the University of Karachi in 1951, the affiliation of the College was transferred to this University. In 1964 a comprehensive plan was prepared to shift the college from its location in the congested downtown area (where no expansion was possible) to a new site adjoining the University of Karachi. The project was
carried out with the assistance of the World Bank which provided Rs.118 millions in two phases and the College was shifted to its new 40 hectare Main Campus in 1975.

On the 1st of March, 1977 the NED Government Engineering College became the NED University of Engineering and Technology. From an enrolment of 50 students in 1923, the student population, at both undergraduate and graduate levels, has now gone up to nearly 8458. The faculty of Bio-Medical Engineering is located at NED LEJ Campus for which the land and building - estimated value Rs. 350 million - was donated by (Late) LatifEbrahim Jamal, a well-known philanthropist. The first Vice Chancellor of the University was Mr. A. M. Akhoond who was succeeded in sequential order by Prof. Dr. A. T. Khan, Prof. Dr. Jameel Ahmed Khan, Prof. Dr. M. MunirHasan, Prof. Dr. A. Q. Qazi and Engr. AbulKalam. Prof. Dr. M. AfzalHaque, is the present Vice Chancellor.
1.2 ADMINISTRATION & ACADEMIC SUPPORT

Vice-Chancellor
Prof. Dr. M. Afzal Haque
B.E. (Mech); Ph.D. (UK)

Dean Faculty of
Civil Engineering and Architecture, Dean (CEA)
Prof. S. H. Lodi
B.E. (Civil) NED; M.S. Oregon State University, USA;
Ph.D. Heriot-Watt University, UK.

Dean Faculty of Mechanical
& Manufacturing Engineering, Dean (MME)
Prof. Dr. Muhammad Tufail
B.E. (Mech); M.Sc.(UK); Ph.D. (UK);
Mem, ASME; Asso.Mem. I MechE;
Mem. ASM; Mem, PEC

Dean Faculty of
Electrical & Computer Engineering, Dean (ECE)
Prof. Dr. Saad Ahmed Qazi (Dean ECE)
B.Sc. Engg. (Hons); M.Sc. (Elect.) (Aligarh);
Ph.D (UK), MIEE (UK); MIEEE (USA)

Dean Faculty of
Chemical & Process Engineering, Dean (CPE)
Prof. Dr. Muhammad Tufail
B.E. (Mech); M.Sc.(UK); Ph.D. (UK);
Mem, ASME; Asso.Mem. I MechE;
Mem. ASM; Mem, PEC

Dean Faculty of
Bio-Medical Engineering, Dean (BME)
Prof. S. H. Lodi
B.E. (Civil) NED; M.S. Oregon State University, USA;
Ph.D. Heriot-Watt University, UK.

Dean Faculty of
Information, Sciences & Humanities, Dean (ISH)
Prof. Dr. Muhammad Tufail
B.E. (Mech); M.Sc.(UK); Ph.D. (UK);
Mem, ASME; Asso.Mem. I MechE;
Mem. ASM; Mem, PEC

Registrar
Syed Ghazanfar Hussain
M.Sc. (Physical Chemistry) (UoK)

Deputy Registrar (Academic)
Syed Arshad Hassan
B.A.; M.A. (Islamic History)

Controller of Examinations
Dr. Irfan Ahmed
Ph.D. (Electrical Engg.); (Michigan Tech., USA)
M.Engg. (Electrical); [NED]/ B.E (Electrical)
2. DEPARTMENT OF CIVIL ENGINEERING

The Department of Civil Engineering has been offering a broad based four-year programme leading to Bachelor of Engineering (Civil Engineering) over the past several decades. In 2012, the Department started offering four-year programme leading to Bachelor of Engineering (Construction Engineering) to be the first of its kind programme in Pakistan. The graduates from this department have not only earned distinctions in the practical field but many of them also have distinguished themselves as known researchers and scholars throughout the globe. Many of the final year projects have been of high academic and research value, and quite a few research papers have been published through these undergraduate research projects.

With respect to the postgraduate programme and related research activities, the department holds the following distinctions:

1. The Department became the first department of the University to offer a programme leading to the Master of Engineering in Civil Engineering from the session 1979-80.

2. The Department became the initiator to start the Master of Engineering Programme for the first time in Transportation Engineering in Pakistan.


4. The Department became the initiator to start the Master of Engineering Management Programme in Water Resources Management in Pakistan in 2011.

2.1 RESEARCH FACILITIES

Laboratory Facilities

Apart from undergraduate laboratories for Materials Testing, Structures and Soil Mechanics, which house the basic testing facilities, new postgraduate laboratories are in the process of development.

Advanced Structural Engineering testing facility already exists with the Department, where research work and proposal leading to Ph.D. could well be undertaken. The laboratories are equipped with state-of-the-art Times Group 2000kN Universal Testing Machine, Shimadzu 500 kN Universal Testing Machine, Forney Compression Testing Machine of 2000 kN capacity, Tinus Olsen Universal Testing Machine of 60,000 pounds, a Forney Pipe Testing Machine of 300 kN capacity, apart from other equipment for testing and data acquisition. The laboratory equipment have been over-hauled and calibrated.

New advanced Material Testing facility has recently been commissioned. It is equipped with state-of-the-art equipment, reaction floor and reaction wall, which will be used for testing of structures, subjected to vertical and lateral loads. The laboratory has the facility to test pre-stressed girders up to 110 ft. long. Equipment includes a Portal Frame designed to work with the 5000 kN Pseudo Dynamic Test System. This system consists of 2 large structural H beams to provide the vertical support and is mountable to reaction floor. Complete system includes 5000 kN actuator, Hydraulic Power Supply, Hydraulic Service Manifold, Digitally supervised analogue servo controls, Pseudo dynamic application software, and a 300 channel data acquisition system. Other equipment include Dynamic Hydraulic Linear Actuator 55 kip (250 kN), Dynamic Hydraulic Linear Actuator 110 kip (500 kN), Structural Test Hydraulic Actuator 220/335 kip (1000/1500kN), Hydraulic Linear Actuator 450/600 kip (2000kN/2670 kN), 300 Channel Data Acquisition System, LVDTs, Load Cells.
The facility is now shared and being administered by the Department of Earthquake Engineering. The postgraduate Geo-technical laboratory has acquired a Seismograph along with the already existing facilities comprising of Triaxial Testing Machine and Plate Loading Test equipment. The laboratory has been extensively utilised for postgraduate research leading to Ph.D.

Fluid Mechanics and Hydraulic Laboratory features 12.5m long open channel to test various hydraulic structures. Newly procured hydraulic bench allows testing of pumps and pelt on turbine at variable flows and configurations. Pipe network and pipe friction laboratory apparatus provide an opportunity to test various pipe materials and configuration of pipes in water supply network. Rainfall Simulator provides an opportunity to study the surface water rainfall-runoff relationships.

Irrigation and Water Resources Engineering Laboratory has been established recently. Time Domain Reflectometry for irrigation scheduling, Channel loop for sediment transport, Acoustic Velocity meter for on spot flow measurement in stream, automatic water level recorder, GPS and computerised laboratory with GIS capabilities provide opportunities for conducting postgraduate studies and research.

Laboratory facilities of other departments may also be utilised for research purposes as well as other departments are also being benefited by the facilities mentioned.

The Department has recently launched a Water Modelling Centre, which can serve researchers, students, and the society in terms of providing capability for managing water related issues, enhance water and environmental conditions throughout the country, perform flood and watershed management practices, and develop models for the upcoming environmental challenges.

**Computing Facilities**

The Department of Civil Engineering has special computing facilities housed in Postgraduate Computational Centre. The Centre contains modern computing facilities, scanners, plotter, and laser printing facilities. The Centre also contains a state-of-the-art Structural Engineering Software Library, which comprises of packages for analysis and design of RC structures including CSI software and TNO Diana. The CSI Package with network license consists of SAP 2000, ETABS, SAFE and CSI Section Builder.

The Department has its main computer centre which runs under a System Manager and is equipped with 70 workstations along with scanning and printing facilities. It has a large number of licensed software related to Civil Engineering and its various specializations. Additionally, the Department has a postgraduate computer centre, which is equipped with 15 workstations along with scanning and printing facilities. It has a hardware and software support conducive to undertaking postgraduate research activities in the Department.

**Other Support**

Department of Civil Engineering subscribes to a number of international research journals to support the academics and research at the postgraduate level.

Department of Civil Engineering has also the honour of being the country’s Information Node on FERROCEMENT. Ferrocement International Network (FINPAKISTAN) was established in the Department through International funding in 1990, and since then has been serving as National Node for disbursing research material, disseminating related knowledge and imparting know-how in ferrocement. The
National node working under INTERNATIONAL NODE at IFIC-AIT-BANGKOK, has access related to the research endeavours in Ferrocement, and has links with researchers, and resource persons in this field.

The Department of Civil Engineering established Cowasjee Earthquake Study Centre (CESNED) in year 2001 after the devastating Bhuj earthquake. The objectives of this endeavour include housing national and global data pertaining to earthquakes and act as a centre for disseminating accumulated knowledge, as well to respond to emergency needs and be able to provide guiding principles for pre and post-earthquake mitigation. Recently, CESNED has been strengthened with the installation of a 3m ×3m Shore Western Seismic Table and Syscom Strong Motion Recorder. Earthquake shaking tables are used extensively in seismic research, as they provide the means to excite structures in such a way that they are subjected to conditions representative of true earthquake ground motions. The shake table system has been used to simulate earthquake loading on masonry structures. A scaled model of a typical block masonry house was recently tested to assess the seismic behaviour of block masonry construction. The activities of CESNED are now administered by the Department of Earthquake Engineering.

NED-CEST (NED-Centre for Engineering Software and training) is also instrumental in the Department and works in collaboration with ACEMOS, AIT, Bangkok.

2.2 ACADEMIC AND INDUSTRIAL RESEARCH ENDEAVORS AND LINKAGES

The Department has shown significant progress in the area of earthquake engineering over the last several years. It is part of several projects related to capacity building funded by UNDP and UNESCO on topics related to earthquake engineering, seismology and impact of tsunamis. These endeavors have led to the establishment of the Department of Earthquake Engineering.

The Department has also endeavoured in the improvement of construction project management framework in the local construction industry. One of the key endeavours undertaken in this regard was a Pak-US collaborative USAID funded project between 2006-2010. As a key outcome of this endeavour, strong academic and research linkages have developed with Florida International University, USA, East Carolina University, USA, and Auburn University, USA.

A summary of recent academic research endeavours by the Department is provided below:

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Funding Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of a Strategic Model for Improvement of</td>
<td>USAID-HEC</td>
</tr>
<tr>
<td>Construction Project Management education, research and</td>
<td></td>
</tr>
<tr>
<td>practice in Pakistan.</td>
<td></td>
</tr>
<tr>
<td>Building Capacity in Pakistan to Seismically Retrofit</td>
<td>USAID-HEC</td>
</tr>
<tr>
<td>Essential Structures</td>
<td></td>
</tr>
<tr>
<td>Development of Diagnostic Tool for Assessing Seismic</td>
<td>NEDUET</td>
</tr>
<tr>
<td>Vulnerability of Buildings</td>
<td></td>
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<tr>
<td>Quantification of flow resistance for unlined canals in</td>
<td>NEDUET</td>
</tr>
<tr>
<td>alluvial soils</td>
<td></td>
</tr>
<tr>
<td>EMME - Earthquake Model of the Middle East Region: Hazard,</td>
<td>Japan Tobacco International</td>
</tr>
<tr>
<td>Risk Assessment, Economics &amp; Mitigation</td>
<td></td>
</tr>
<tr>
<td>Pakistan Tectonics and the 2004 Kashmir Earthquake</td>
<td>National Science Foundation</td>
</tr>
<tr>
<td>Fibre Reinforced Polymers (FRP) for Civil Infrastructure</td>
<td>HEC</td>
</tr>
<tr>
<td>in Pakistan</td>
<td></td>
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</tbody>
</table>

Culminating out of the above collaborative research endeavours, the
Department has been instrumental in organizing the following series of international peer-reviewed conferences in joint partnership with universities from USA.

i. Series of International Conferences on Construction in the 21st Century (CITC)

ii. Series of International Conferences on Construction in Developing Countries (ICCIDC)

A summary of recent local industry funded research endeavours by the Department is provided below:

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Funding Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Extreme bars (Grade 75) in Structural Members</td>
<td>Amreli Steels</td>
</tr>
<tr>
<td>Mechanical Properties of Polypropylene fibre reinforced concrete (PPFRC) and structural Applications</td>
<td>Matrixx Company</td>
</tr>
<tr>
<td>Study of properties of locally available cements</td>
<td>Lucky Cement</td>
</tr>
<tr>
<td>Subsurface drainage system design</td>
<td>FFC, MirpurMathelo</td>
</tr>
</tbody>
</table>

A list of recent research endeavours undertaken by postgraduate students is provided below:


ii. Pavement Performance Prediction Modelling using Material Characterization

iii. Macroscopic dynamic traffic network models and their validation

iv. Calibration of Car-following models for different traffic stream scenarios of Karachi city

v. Development of Fragility Curves for Lifelines

vi. Condition assessment and strengthening of old distressed RC Residential Buildings

vii. Constitutive modelling of concrete subjected to multiaxial state of stress using damage mechanics

viii. Seismic Vulnerability Assessment of Existing Building in Pakistan

ix. Shear Strength of One-way reinforced concrete flexural members by strut-and-Tie model

x. Seismic Vulnerability Assessment of RC Structures using Nonlinear Dynamic Analysis

xi. Evaluation of Contribution of Concrete Block Infill Panels on Nonlinear Response of RC Frames

xii. Nonlinear Modelling of stone masonry construction

xiii. Hazard Assessment of Northern Region Around Karachi using GPS techniques

xiv. Development Soil Amplification Contour Maps for Karachi

xv. Inventory Development for Building Data in Pakistan

xvi. Tsunami Inundation Modelling for Karachi

xvii. Computational modelling of RC Beams Strengthened in predominant Shear and Flexure Loading regions using CFRP

xviii. Finite Element based Elastic Plastic Damage model for Reinforced Concrete

xix. Achieving Energy Smart Buildings through Building Information Modelling

xx. Development of an Artificial Intelligence based tool for Predicting the cost performance of Construction projects

xxi. Building Information Modelling- A cost effective Zero Defects and Zero Accident Solution for
A few of the postgraduate research endeavours have won competitive scholarship from a number of industrial and academic support sources such as: Tameel Group, Construction Materials Research Group (CMRG), Razaque Steels, NED Alumni Association of South California, Rafeeqi Research Endowment in Earthquake Engineering, etc.

The above research efforts have culminated in publication of a number of impact factor research papers and publications in international refereed conference proceedings. For the last three years (2010-2012), the numbers are 25 and 106 for journal and conference papers respectively.

Moreover, as a result of these successful research endeavours, the Department has formed a number of linkages with other universities around the world, specifically with the following universities:

i. University of Loughborough, UK
ii. Florida International University, USA
iii. East Carolina University, USA
iv. Auburn University, USA
v. Geo-Hazard International, USA
vi. University of California, Berkley, USA
vii. Stanford University, USA
viii. Middle East Technical University, Turkey
ix. ACECOMS, Asian Institute of Technology, Thailand
x. University of Montana, USA
xi. University of Colorado, USA
xii. University of Minho, Portugal
xiii. University of Washington, Seattle, USA
xiv. EU-NICE (Eurasian University Network for International Cooperation in Earthquakes)
   a. Sapienza University of Rome, ITALY
   b. University of Chieti-Pescara, ITALY
   c. University of Basilicata, ITALY
   d. University of Patras, GREECE
   e. University of Aveiro, PORTUGAL
   f. NSET National Society for Earthquake Technology, NEPAL
   g. Tribhuvan University, NEPAL
   h. University of Dhaka, BANGLADESH
   i. Prince of Songkla University THAILAND
   j. Chongqing University, CHINA
   k. Nangarhar University, AFGHANISTAN

Key national collaborations resulting from these successful research endeavours include:

i. National Disaster Management Authority, Pakistan
ii. SUPARCO
iii. University of Peshawar, Pakistan
iv. University of Baluchistan, Pakistan
v. Amreli Steel
vi. MATRIXX Company
vii. Lucky Cement
viii. Frontier Works Organization (FWO)
ix. Izhar Construction
x. Karachi Water and Sewerage Board
xi. WWF - Pakistan
2.3 FACULTY MEMBERS

Chairman
Prof. Dr. Asad-ur-Rehman Khan
99261261-8
Ext. 2205

Co-Chairman
Prof. RizwanUlHaqueFarooqui
99261261-8
Ext. 2273

Professors
1. Prof. SaroshHashmat Lodi
B.E. (Civil) NED;
M.S. USA;
Ph.D. Herriot-Watt University, UK

2. Prof. Dr. Asad-ur-Rehman Khan
B.E. (Civil) NED;
M.S. (Civil) KFUPM, Saudi Arabia;
Ph.D. KFUPM, Saudi Arabia

3. Prof. Dr. Muhammad Shafqat Ejaz
B.E. (Civil) NED;
M.S. (Civil) NED;
Ph.D. Utah State University, UK

4. Prof. Dr. Syed Imran Ahmed
B.E. (Agri. Engg.) SAU, Pakistan;
M.S. (Bio resource Engg.) Oregon State University, USA;
M.S. (Bio systems Engg.) IOWA State University, USA;
Ph.D. (Bio systems Engg.) IOWA State University, USA

5. Prof. RizwanUlHaqueFarooqui
B.E. (Civil) NED;
M.S. (Civil) National University of Singapore, Singapore;
Ph.D. (Civil) Florida International University, USA

6. Prof. Dr. Abdul Jabbar Sangi
B.E. (Civil) NED;
M.Engg. (Civil) NED;
Ph. D. Herriot-Watt University, UK

7. Prof. Dr. Amanullah Marri
B.E. (Civil) QUEST;
M.E. (Civil) Asian Institute of Technology, Thailand;
Ph.D. University of Nottingham, UK

Associate Professors
1. Dr. Raza Ali Khan
D.P.A. (Public Administration);
M.A. (I.R.) University of Karachi;
M.A. (Economics) University of Karachi;
M.S. (Economics) SZABIST, Karachi

2. Mr. Aftab Ahmad Farooqi
B.E. (Civil) NED;
M.Engg. (Civil) NED
3. Dr. Haider Hasan
   B.Sc. (Math. & Computing) Kingston University; M.Sc. (Environmental & Industrial Modeling) University of Bristol, UK
   Ph.D. (Civil) University of Nottingham, UK

4. Dr. Huma Khalid
   B.E. (Civil) NED;
   M.Sc. (Computer Science) NED;
   Ph.D. Imperial College of Science, Technology & Medicine University, UK

5. Dr. Arjumend Masood
   B.E. (Civil) NED;
   M.Eng. (Env. Engg.) NED;
   M.Engg. (Civil) NED
   Ph.D. NED

2.4 RESEARCH AREAS
The current research interests of the Department are as follows:

**Structural Engineering**
- Re-strengthening and repair techniques
- Constitutive modelling of reinforced concrete and ferrocement
- Tensile and compressive membrane action
- Behaviour of reinforced concrete in mixed moment field
- Post cracking tensile strength
- Bond in reinforced concrete
- Structural behaviour of cold formed steel sections
- Models for shear and flexural strength of Ferrocement
- Ferro-cement application and its use
- Infilled masonry panels subjected to lateral loads
- Non engineered construction in the rural areas
- Ductility of reinforcing bars produced in Pakistan
- Structural use of recycled concrete aggregates
- Finite element analysis of reinforced concrete structures
- Impact loads on reinforced concrete structures

**Materials Engineering**
- Fire resistance of concrete structures
- Fibre reinforced polymers in construction
- Behaviour and assessment of masonry structures
- Design, development, production and assessment of materials in the transportation industry
- Design, development, production and assessment of materials in the construction industry
- Durability of bituminous materials under tropical conditions
- Evaluation of engineering properties of mineral compounds, superplasticisers, binders, polymeric compounds and stabilising agents
- Determination of rheological properties of cement pastes and bitumen
**Mechanical properties of recycle concrete aggregates**
- Cement replacement materials
- Properties of locally manufactured reinforcing bars
- High strength and high performance concrete

**Geo-technical Engineering**
- Numerical / Constitutive modelling of soils
- Evaluation of static and dynamic parameters of different soil strata
- Evaluation of sub soil geological conditions
- Indigenous methodologies for ground improvement techniques
- Development of indigenous methodologies and equipment to carry out experiments in the field and laboratories
- Static and dynamic stiffness of pile foundation

**Transportation Engineering**
- Pavement distress evaluation and material characterisation
- Redesign and signal optimisation of roundabouts
- Capacity improvements of major urban and rural routes
- Road condition monitoring and development of remedial strategies
- Road design techniques in arid and coastal areas
- Geometric and structural design of flyovers in Karachi using software packages
- Stability analysis of highway embankments under waterlogged conditions
- Use of expert systems in geometric design of highways
- Analysis and design of urban road drainage systems
- Mechanistic and finite element analysis of major national highways in Pakistan
- Pavement condition monitoring and evaluation of roads and airport airside
- Non-linear behaviour of pavements under heavy axle loads
- Development of travel demand forecasting models for urban areas
- Economic appraisal of highway projects using HDM and RTIM models
- Application of Geographic Information System (GIS) for facility management

**Construction Management**
- Building Information Modelling
- Artificial Intelligence
- Sustainability, Green and Energy Smart Construction
- Information and Communication Technology
- Risk Management and Insurance
- Safety Management and Zero Accident Strategies
- Quality Assurance and Total Quality Management
- Productivity Improvement
- Financial Management, Accounting and Economics
- Project Planning and Scheduling
- Resource Optimization
• Project Controls
• Assets Management/ Facilities Management
• Procurement, Bidding Strategies, Claims, Legal Environment
• Preconstruction (such as Value Engineering, Constructability Analysis)
• Entrepreneurial Drive and Skills in Construction Industry
• Business Strategies, Strategic Management, Marketing and Management of Construction Business
• Construction Industry Business and Regulatory Environment

**Coastal and Harbour Engineering**

• Morphology of Coastal Processes (waves, currents, tides, dredging, etc.)
• Port Planning Method and Models
• Development of Containerisation
• Computer Application in Port Containerisation
• Environmental Impact of Port development
• Port Economics

**Water Resources Engineering and Management**

• Sectoral Water Allocation, Releases and Performance
• Water Balances, Recharge/Discharge Areas Delineation
• Drainage
• Water Supply: Domestic, Industrial, Agriculture, etc.
• Tertiary Level Irrigation System in Indus Basin
• Conservation of Water, Watercourse Lining
• Modelling
• Water Accounting and Irrigation Scheduling, Application Efficiency
• Monitoring and Evaluation
• Barrage and Canal System
• Groundwater System
3 DEPARTMENT OF ENVIRONMENTAL ENGINEERING

INTRODUCTION

The Department of Environmental Engineering has been effectively contributing in academics, research, training, and community based activities since its inception as the Institute of Environmental Engineering and Research twenty seven years ago. The Department administers postgraduate programme leading to the degrees of Masters of Engineering (Environmental) and Master of Engineering Management (MEM) in Environmental Management. The programme is conducted both in morning and evening times. The degree programme is structured so as to deepen and broaden the student’s knowledge in the field of Environmental Engineering. The department of Environmental Engineering has the honour to start the master programme for the first time in Environmental Engineering in Pakistan and also has the honour to be one of the first departments of NED University to successfully offer Masters of Engineering programme in the morning. The current student strength in the various postgraduate programmes offered by the department is 101.

The current fields of research encompass low-cost water and wastewater treatment, bio energy production from sustainable anaerobic digestion, satellite remote sensing applications for environmental management and bio diesel. Independent research projects in the fields described above are being carried out under supervision of foreign qualified faculty members. Moreover, the department is also working on industry based problems and is in the process of establishing research collaborations with world class International Universities.

3.1 RESEARCH FACILITIES

The department of Environmental Engineering has laboratories equipped to conduct research work. Facilities available for research include the Water quality laboratory, and Biodiesel Laboratory.

Water quality laboratory is equipped with equipment for quantifying selected environmental contaminants in water. The laboratory is configured for:

- organic and inorganic chemical analysis
- microbial analysis

The laboratory offers facilities for analysis of heavy metals by Atomic Absorption Spectrometer and Gas Chromatograph for analysis of trace organic contaminants. Microbial facilities are available and the laboratory is equipped with autoclave, microscopes, shakers and incubators.

The Biodiesel laboratory is equipped with instruments including Cloud, Pour and Cold Filter Plugging Point (CFPP) Analyzer for ultra-low temperature cold behavior testing, Thermal analysis system (TGA/DSC) for investigating thermal properties, Viscometer for viscosity measurement and Portable Density meter.

A summary of recent research projects by the Department is provided below:
### Name of Project | Funding Agency
--- | ---
Application of Solar Disinfection for Treatment of Contaminated Water | NEDUET
Renewable Energy Production Using Sustainable Anaerobic Digestion Process | NEDUET
Baseline Study for Solid Waste Management - Karachi | International Union for Conservation of Nature (IUCN)
Renewable Energy Production Using Sustainable Anaerobic Digestion Process | NEDUET

#### 3.2 RESEARCH AREAS

#### 3.3 FACULTY MEMBERS

The department has two HEC approved supervisors, one faculty member has expertise in the field of wastewater treatment while the other in field of satellite remote sensing applications for environmental management.

1. Prof. Dr. Asif Ahmed Shaikh  
   B.E. (Civil), M. Engg. (Civil),  
   Ph.D. (Engineering Systems Science).

2. Dr. Atif Mustafa  
   B.E. (Civil), M. Engg. (Environmental),  
   Ph. D. (Civil & Environmental Engineering)
4 DEPARTMENT OF EARTHQUAKE ENGINEERING

INTRODUCTION

Pakistan has always been an earthquake prone country owing to its tectonic settings. Every time an earthquake struck this region lack of disaster mitigation capacity in Pakistan was revealed. The Department of Civil Engineering realized the importance of building capacity in earthquake disaster mitigation in the Country and established Cowasjee Earthquake Study Center (CESNED) on 28th April 2001. The experience gained through the activities of CESNED and the expertise developed in earthquake engineering in the last one decade provided a strong basis for the establishment of Department of Earthquake Engineering. The need of this Department was also strengthened in the post 2005 Kashmir earthquake scenario. The underlying purpose of the Department of Earthquake Engineering is to develop highly skilled professionals and researchers who are trained in various aspects of earthquake mitigation so that they are able to serve the society through better planning and preparation.

The Department benefits immensely from the earlier activities in the area of earthquake engineering through CESNED and plans to strengthen these further by creating strong linkages with industry and other similar organizations. The Department plans to offer courses, designed to suit the needs of professional engineers working in the construction industry as well as to strengthen already existing research activities in the area of earthquake engineering and related disciplines.

Earthquake Engineering is a specialized field of knowledge that deals with the understanding and implementation of ideas related to generation and propagation of earthquakes through various geological features and behaviour of structures subjected to seismic loading. This course comprises of the study of elastic and inelastic response of structures subjected to ground motion excitation. Seismic design of new structures and assessment of existing infrastructural facility are also dealt with in SEE.

4.1 RESEARCH FACILITIES

Experimental Testing

The Department owns two most modern laboratories in the Country. These include Shake Table Laboratory (STL) and Advanced Material Testing Laboratory (AMTL). These provide state-of-the-art facilities for testing structures using dynamic and pseudo-dynamic loading regime. In addition, the Department shares testing facilities in Material Testing Laboratory and Concrete Laboratory administered by the Department of Civil Engineering.

Numerical Testing

The Department of Earthquake Engineering shares the computing facilities housed in Postgraduate Computational Centre with the Department of Civil Engineering. The centre is equipped with all the facilities necessary for any modern computational centre. The centre also contains a state-of-the-art Structural Engineering Software Library including analysis and design of RC Structures using CSI Package and TNO Diana. The CSI Package with network license consists of SAP 2000, ETABS, SAFE and CSI Section Builder.

4.2 EXPERTISE AVAILABLE

- Structural Earthquake Engineering
- Structural Fire Engineering
- Engineering Seismology
- Disaster Management
- Material Behaviour and Characterization
4.3 RESEARCH AREAS

- Behaviour of FRP and steel reinforced concrete structures
- Fire resistance of concrete structures
- Recycling of concrete
- Retrofitting of reinforced concrete and masonry structures
- Repairs of steel and RCC Structures using fibre reinforced polymer’s (FRPs)
- Fatigue and impact loading on structure
- Experimental and numerical testing of concrete and steel structures

- Performance based seismic design and assessment of structures
- Seismic hazard assessment
- Nonlinear dynamic response of multi-storey framed structures
- Contribution of higher modes on drift and strength demands
- Influence of masonry infill panels on dynamic response of frames
- Seismic performance of non-engineered buildings
- Assessment and evaluation of structures including bridges

4.4 FACULTY MEMBERS

Chairman
Prof. Dr. Muhammad Masood Rafi

Professors
1. Prof. Dr. Muhammad Masood Rafi
   B.E.(Civil) NED University;  
   M.Sc.(Civil) NED University;  
   Ph.D.(University of Ulster, UK)

2. Prof. Dr. Rashid Ahmed Khan
   B.E.(Civil) NED University;  
   M.Sc.(Civil) NED University;  
   Ph.D.(Herriot-Watt University UK.)

Associate Professors
Dr. Mukesh Kumar
   B.E.(Civil) NED University;  
   M.E.(Civil) NED University.  
   M.E.(Earthquake Engg.) Italy  
   Ph.D.(Imperial College of London, UK)
5 DEPARTMENT OF ARCHITECTURE AND PLANNING

INTRODUCTION

The NED University has remained the foremost institution in professional education in engineering and related disciplines. In its working, the University had developed a regulatory, academic and administrative framework for architecture and planning education which today provides a useful framework for appropriate education in these disciplines. The working strength of architects is much less than what is practically needed. Given the vast professional sphere in which the architects operate, the numerical strength is simply minimal. A technically sound and socially responsive breed of architects and planners need to be produced to fill this widening gap. Architecture and Planning Department at NED University has been attempting to these and several other related challenges in the professional domain.

The creation of a Department of Architecture and Planning has been a part and parcel of NED’s Master Plan. The present resources, facilities, spaces and technological backup are ample and adequate to support this purpose. Besides, the presence of various disciplines at the University act as a supportive factor for the Architecture Department. Ever since its creation in 2000, the Department has undertaken numerous research and outreach activities. The Journal of Research in Architecture and Planning, launched in 2001, has now been regularly published on bi-annual basis. The department was a collaborative partner with four international universities from Europe and South Asia in the European Commission funded Asia Link and Asia-UrbsProgrammes between 2004-2007. This linkage produced several research outputs in the field of urban design. Besides, the Department is the Secretariat of International Council of Monuments and Sites (ICOMOS) and local office of UNESCO University and Heritage Linkage. The Department collaborated with the United Nations Centre for Human Settlements (UN-HABITAT) for preparation of City profiles and plans of Larkana, Kech-Turbat, Sialkot, Gilgit, Mingora, Mansehra, LandiKotal and Muzzaffarabad (in Azad Jammu and Kashmir) in 2011-12. The department collaborated with International Institute of Environment and Development (IIED) to undertake Karachi Land Study which will be published soon in a monograph form.

The Department has been conducting a Master of Urban and Regional Planning Programme since 2002. This programme was launched with the active assistance from University of Western Sydney, Australia. A significant need was also found for the initiation of Master of Architecture Programme due to diversifying job market, enhanced demand of specialized capacity in the domains of theoretical and application spheres and development of teaching faculty in architectural theory and design pedagogy. It is also worthwhile to note that no postgraduate programme in architecture exists in the entire province of Sindh despite the fact that six architectural institutions are currently functioning. Master of Architecture Programme, initiated in 2009, is therefore aimed to serve the need of the country. With this backdrop, the department is prepared to supervise doctoral candidates as per University policy.

5.1 RESEARCH FACILITIES

The Architecture and Planning Department is located at NED City Campus on Maulana Din Muhammad Wafai Road. It possesses adequately equipped computer labs with up-to-date hardware and relevant software’s. The Department also possesses an archive which houses the most recent literature, reading material and audio-visual aids related to architecture and urban and
regional planning studies. A reference library is also available for the access of post graduate students to fulfil the need of textbooks, reference books, periodicals and journals. Due to links and networking of the department, the post graduate students can also obtain useful information material from private institutions such as the Urban Resource Centre.

5.2 RESEARCH AREAS
The following are the proposed areas of research
- Architectural Theory
- Applied Architectural Studies
- Historic Preservation, Restoration and Conservation
- Urban Design
- Urban and Regional Planning

5.3 FACULTY MEMBERS
At present, the following faculty members are available to supervise doctoral research:

1. Prof. Dr. Noman Ahmed
   B.Arch. (NED; M.C.P. (METU-Ankara);
   Certificate in Regional Development Planning (UNCRD, Nagoya);
   Certificate in Urban Development Studies (Harvard, USA);
   PhD (Loughborough, UK)
   AIAP, MPCATP

2. Prof. Dr. AnilaNaeem
   B. Arch. (NED); M.S. in Historic Preservation (METU-Ankara);
   Certificate in Stone Conservation (ICCROM, Venice)
   PhD (Oxford Brookes, UK)
   AIAP, MPCATP
6. Department of Urban and Infrastructure Engineering

INTRODUCTION:

A fundamental need for civilization in the 21st Century is the development of urban habitats that are both environmentally sustainable and functionally dependable for people and society. To meet these challenges Urban & Infrastructure Engineering Department has been recently introduced in NED University of Engineering and Technology in 2008. The department aims to provide students background of planning, design and management of the urban community. Its objective is to deliver capacity building and value addition to the youths of the society in the form of Urban & Infrastructure Engineer. This objective is well served with state-of-the-art teaching facilities and dedicated faculty members. The department also keeps coordination with other local and international stakeholders such as; CDGK, Jinnah Post Graduate Medical Centre and University of Mississippi (USA) for research based sharing of knowledge and served oriented activities. In December 2012, the department has signed MOU with Transport Research Institute University of Hasselt, Belgium (IMOB) that includes collaborative research in the field of traffic congestion, faculty and student exchange (using virtual environment teaching), value addition short courses, joint PhD Programmes, as well as the reduction of the annual tuition fee from 6000 Euros to 600 Euros (equivalent to European nationals) for students of NED for their master’s study in IMOB.

The department of Urban and Infrastructure Engineering has now taken another initiative by introducing a post graduate degree programme (MEM) in Transportation Infrastructure Management. The major idea behind this programme is to link the concept of management with the deriving engineering fields to produce professional that are better capable of managing the engineering projects than the conventional business managers. Transportation Infrastructure management is an attempt to strengthen the programmewith another much needed derivative. Considering the wild scope of the field this Master’s program is focused towards the management of transportation systems and their sustainable operation.

6.1 RESEARCH FACILITIES

The Department contains following research facilities in different areas of urban and infrastructure engineering

1) Transportation Engineering Laboratory; that provides facilities for testing various properties of highway materials according to ASTM and British standards. Testing equipment available in laboratory contains Wheel Tracking Machine for Rutting measurement, Marshall test equipment, LA Abrasion machine, Ductility testing facility, Specific Gravity testing equipment, and Bituminous material consistency test apparatus etc.
2) GIS Laboratory; that contains state of the art Geographic Information System software packages (ArcGIS®), Remote sensing software (Geo Media®) along with some other utility packages to facilitate research on spatial aspects of urban engineering problems.

3) Traffic Engineering Cell; that contains facilities in the form of instrumented vehicle (equipped with real time recording of traffic through mounted CCTV cameras, GPS based real time vehicle tracking system), Laser speed Gun, State of the art traffic microsimulation package (S-Paramics®), macroscopic travel demand forecasting package (EMME®), Traffic video processing software for heterogeneous traffic (TRAZER®) and other statistical software such as SPSS®.

4) State of the art computer Laboratory which equipped with licensed softwares required for general engineering purposes such as MS Office, Primavera, MATLAB, AUTOCAD, Civil 3D etc.
### Research in Traffic Engineering Transport Planning

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Project Title</th>
<th>Funding Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Development of an ITS–based Traffic Management Model for Metropolitan Area of Pakistan with Karachi as a Pilot Study</td>
<td>HEC &amp; USAID</td>
</tr>
<tr>
<td>2</td>
<td>Incorporation of Traffic Heterogeneity in Capacity Analysis of Multi-Lane Urban Arterials of Karachi through Development of a Simulation Model</td>
<td>NED UET</td>
</tr>
<tr>
<td>3</td>
<td>Road Safety Research</td>
<td>WHO / Indus Motors</td>
</tr>
<tr>
<td>4</td>
<td>Toyota- Research on Traffic Congestion</td>
<td>Indus Motors</td>
</tr>
<tr>
<td>5</td>
<td>Calibration of Car Following Models For different Traffic Scenarios of Karachi</td>
<td></td>
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<tr>
<td>6</td>
<td>Empirical Validation of Macroscopic Dynamic Network Loading Models</td>
<td></td>
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</tbody>
</table>

### Research in Building and Pavement Materials

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Project Title</th>
<th>Funding Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Evaluate the rutting potential of asphalt concrete by adding polymer fiber</td>
<td>FWO</td>
</tr>
<tr>
<td>2</td>
<td>Finite Element Analysis of Tractor Trolley Tyres on Bituminous-bound Macadam Roads of Pakistan</td>
<td>Masters Research</td>
</tr>
<tr>
<td>3</td>
<td>Flexural and Shear Behaviour of polypropylene reinforced lightweight aggregate concrete and the effect of polypropylene fibre</td>
<td>Masters Research</td>
</tr>
</tbody>
</table>
Projects Completed:

The department is active in various research dimensions encompassing almost all major fields of Urban Engineering. This is evident from various national and international funded research projects carried out in the department, few examples are: Intelligent Transportation system based model for Karachi, Heterogeneity of Transport modes and their incorporation in capacity analysis, Quantification of economic cost of traffic congestion, rutting behaviour of alternative pavement materials, Aggregate information system and road accidents data collection and performance monitoring. In addition to this, the department has active collaboration with other institutes of the world such as Hasselt University, Belgium, and involved in increasing expertise through joint research projects.

Research Projects (in Pipeline)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Project Title</th>
<th>Funding Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Establishing Trips rate and Parking Ratios for Selected Area of Karachi</td>
<td>PSF</td>
</tr>
<tr>
<td>2</td>
<td>Investigation of the Rutting and Fatigue Performance of Asphalt Concrete</td>
<td>HEC</td>
</tr>
<tr>
<td></td>
<td>Reinforced with Geotextile Materials</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Development of Highway Pavement Maintenance Management System for Pakistan</td>
<td>HEC &amp; USAID</td>
</tr>
<tr>
<td></td>
<td>with Karachi as a Case study</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rutting and Fatigue Evaluation of Asphalt Concrete Incorporated with Recycled Aggregates</td>
<td>PSF</td>
</tr>
<tr>
<td>5</td>
<td>The applications of polypropylene-fiber in the construction of sustainable highway infrastructures in Pakistan (USAID)</td>
<td>HEC &amp; USAID</td>
</tr>
</tbody>
</table>

6.2 RESEARCH AREAS

The department has set high standards for research and offer PhD research projects in prominent and demanding research areas. The following are some proposed areas of research in accordance with the expertise available.

1) Rutting and fatigue behavior of modified asphalt concrete
2) Pavement maintenance management system for highways and airports
3) Design of highway pavements on areas prone to soil liquefaction
4) Dynamic traffic flow and assignment models
5) Adaptation of capacity analysis procedure for heterogeneous traffic conditions
6) Modeling road accidents to ascertain effects of contribution of various factors

7) Risk assessment practices influences on construction productivity
8) Construction productivity advances and opportunities for improvement
9) Activity-based travel demand model for cities of developing countries
10) Advance methods for collecting Traffic data and online calibration of traffic models
11) Analysis of Parking problems and finding compatible solutions
12) Demand Management strategies for solving transport problems in developing countries
13) BRT and LRT Systems? Are they effective in cities of Developing countries
14) Qing-Qi – An alternative low cost mass transit solution
6.3 FACULTY MEMBERS:

Professors
1. Prof. Dr. Mir Shabbar Ali
   B.E (Civil)
   M.S (University of Oklahoma, USA)
   Ph.D. in Transportation;
   University of Birmingham, UK

2. Prof. Dr. Adnan Qadir
   B.E (Civil) NED University
   M.Engg. (Civil) NED University;
   Ph.D. (Transportation) Middle East Technical University Ankara, Turkey.

Associate Professors
3. Prof. Dr. Muhammad Raza Mehdi
   B.E (Civil); M.Sc. (Transportation); Ph.D. (Environmental Science)

2. Dr. Muhammad Adnan
   B.E. (Civil) NED University;
   M. Engg. (Civil) by Research NED;
   Ph.D. (Transportation) (Leeds) UK

Assistant Professor
1. Dr. Sana Muqeem
   B.E (Urban) NED University;
   M.Engg. (Civil) NED University
   Ph.D. (Construction Management)
   University of Technology Petronas, Malaysia
7. DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION

Mechanical Engineering Department, which was founded in 1937 at the former NED Government Engineering College, is now located at Main Campus with its laboratories equipped with state-of-the-art equipment. The Department takes pride in producing engineers that have served not only the regional and global organizations, but the nation and mankind at large. At present, the Department offers Bachelors, Masters and PhD degrees.

The undergraduate programme is based on four years instructional education leading to the degree of Bachelor of Engineering. The Department has been offering Master of Engineering since 1999. Three areas of specializations are being offered, which are: i) Design ii) Energy Systems iii) Mechatronics. The programme comprises of five semesters which enables practicing engineers working in various industries to update and improve their knowledge. The programme is running quite satisfactorily and the number of applicants is progressively increasing each year.

Ph.D. Degree programme is being offered for almost ten years. Details of laboratory facilities, PhD projects and other post graduate level projects are given below. The Department has various Research Groups in different areas including Energy and Mass Transfer, Design & Manufacturing and HVAC (Heating, Ventilation & Air Conditioning).

7.1 RESEARCH FACILITIES

Laboratory Facilities

Renewable energy is today’s world’s need. Keeping up with the development in this field, Solar Energy Lab at Mechanical Engineering Department features complete testing facility for both the solar photovoltaic (PV) systems and thermal systems including flat-plate collectors, heat pipes and different types of concentrators.

The lab is equipped with weather station capable of monitoring various parameters including wind velocity and direction, temperature, humidity, solar radiations, and pyranometers along with shadow band and tilt adjustment assemblies. Different types of PV panels, heat pipes and parabolic concentrators with tracking systems are also available. Thermoelectric generator (TEG) modules have been integrated with solar thermal system which is one of the most recent research areas nowadays. TRNSYS, Matlab, RETScreen and PVWatts software can be used for modeling and analysis of solar systems. One of the achievements in solar energy research is the development of a useful tool ‘oTilt’, available on www.oTilt.com, which is an online application for estimating optimum tilt angles and energy collection on tilted surfaces. This application has recently been listed in renowned online directories including US Department of Energy (US DOE) and Open Energy Information (OpenEI) portal.
Wind turbine design, fabrication & testing facilities are also available. This facility is equipped with wind resource assessment by capturing, monitoring and analysing available wind data. Weather station along with data logger is available for this purpose. The data is further processed on various latest software such as Wind Farmer. Designing of wind turbine blades is also carried out. For this purpose different algorithms have been developed based on various blade design models. The facility of testing the fabricated wind turbine within the closed and controlled environment has also been developed. Field testing and monitoring is then performed after installation of wind turbine.

Acoustics and Vibration Laboratory is fortified with state-of-the-art acoustics, vibration diagnostics, monitoring and analysis equipment. The laboratory has two plane Hard Bearing Dynamic Balancing Machine for rotors. This machine has its utilization in industrial projects as well as in post graduate research. Rotors, weighing from 20 kg to 3200 kg, can be mounted at approximately 5000 rpm and are balanced either by mass addition or mass removal. Extraction of modal parameters by utilizing the Vibration Exciter System (Shaker machine) is also available. It is equipped with Synthesizer Function Generator with complete random and periodic function generator. Response is captured through magnetic accelerometers/strain gauges which can further processed to obtain Frequency Response Functions (FRFs) in FFT analyzer. This equipment can also be utilized for prediction of low frequency eigen modes. The facility to extract modal parameters through local excitations is also available by employing Impact Hammer facility. An Operating Deflection Shape (ODS) can be plotted on software after the FFT of acquired data. Both Rigid and Flexible modes can be identified through this technique. Compliance, Mobility, Dynamic Stiffness, Impedance and Dynamic Mass of elastic bodies can be predicted through it.

Acoustics of any room, office, job floor and workshops etc. can be predicted, quantified, monitored and corrective measures can be made to acceptable dB levels by utilizing Sound Level meters. This equipment is given with data logger on which data can be stored and processed to make sound spectrum according to ISO 9001 standards. It can also be used to generate white noise spectrum. Precision Vibration level meter can be utilized to predict and monitor vibration levels in g readings of any machine, generator and rotary parts. It has built in data logger for storage and post processing of data.

Pressure drop and correlation of friction factors can be investigated using Fluid Friction Pipes Test Bench in Fluid Mechanics Lab. Characteristic curves for various types of pumps such as centrifugal, reciprocating and gear can be analysed against various parameters including RPM, torque and efficiency using Multi Pump Testing Rig. Hydrostatic Pressure Test Bench can be used to determine differential pressure measurements of several fluids.
Steam Generation & Steam Turbines Laboratory has a fully functional electric boiler capable of producing steam at 10 bars and 54 kg/h (F&A 100 degree celsius). This steam can be utilized in any experimental rig designed to operate using steam. The boiler is shell-type with two electric resistances requiring 36 kW during operation. A water treatment bench is used for feedwater treatment for boiler but it can also be used as a stand-alone setup for related experiments.

Heat Transfer laboratory is equipped with Linear and Radial Heat Conductors (Armfield) which are used to apply Fourier Rate equation to steady-state conduction in plane wall (Cartesian) and radial directions. Measurement of heat flow and temperature gradient allows the thermal conductivity of the material to be calculated. Combined Convection and Radiation equipment is used for the analysis of combined effects at varying surface temperatures and air velocities past the surface. Measurement of the surface temperature of uniformly heated cylinder and the electrical power supplied to it allows the combined effects of radiation and convection to be compared with theoretical values. The dominance of convection at lower surface temperatures and the dominance of radiation at higher surface temperatures can be investigated. Extended Surface Heat Exchanger, a long horizontal rod, which is heated at one end, provides an extended surface for heat transfer measurements. Thermocouples at regular intervals along the rod allow the surface temperature profile to be measured. The measurements obtained can be compared with a theoretical analysis of thermal conduction along the bar combined with heat loss to the surroundings. Transient heat transfer analysis can be performed using Unsteady State Heat Transfer equipment.

OsmonicsSepa CF Membrane Cell is available in Desalination laboratory that is used in membrane development and small scale production. In addition, a multistage centrifugal reverse osmosis plant with 38 stages and 3 gpm capacity is also available.

The Solid Mechanics/Material Testing Laboratory is comprised of two 60,000 lbs. Universal Testing Machines (Tinius Olsen), two hardness-testing machines and a 5000 kg spring testing machine (Torsee).

A locally fabricated downdraft gasifier is also available to carry out investigations using different fuels including coal, wood and bagasse.

Computing Facilities

The department features extensive computational resources available for a wide range of applications, from data analysis to numerical modeling, stress analysis, fluid dynamics, modeling of components, design of experiments and simulation software.

The department has 50 workstations in its main lab; it has a large number of licensed software including ANSYS, Pro-E,
Gambit, Wind Farmer, Maple, ADINA, Matlab, CFX, Stat Ease and Minitab.

Moreover, there is a separate Computational Thermo-Fluid facility. This lab was developed by Mechanical Engineering Department and is now routinely used in engineering design process. It contains software related to Computational Fluid Dynamics such as ANSYS Fluent, CFX, ICEM CFD and Tecplot. Laboratory contains a dedicated computing cluster comprising of 17 servers of HP Pro Liant clusters. The cluster contains 32 AMD quad-core Opteron processors with 8GB RAM on each. On head node AMD 24 core processor with 32 GB is installed.

Other supports

Department of Mechanical Engineering has also access to various international research journals from Engr. Abdul Kalam Library to support their postgraduate students.

We also have support from international societies including American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) and American Society of Mechanical Engineers (ASME).

ASHRAE Student Chapter at NED has grown to be the largest in Pakistan. This is the premier international society for professionals working in the fields of heating, ventilation and air conditioning (HVAC). The society has over 54,000 members worldwide and its codes and standards are followed across the globe.

NED ASME chapter has always represented the global face of mechanical engineering community, work to groom the engineers of future and have a positive impact on their educational culture.

Research group NEED (Network of Excellence in Energy Development Group) assists in managing the country's energy crisis by promoting interdisciplinary research and development.

7.2 ACADEMIC & INDUSTRIAL RESEARCH PROJECTS AND LINKAGES

The department has shown significant progress in the areas of conventional and renewable forms of energy and thermo-fluid dynamics. Following is a list of related postgraduate projects:

- Simulation of Turbulent Axisymmetric Impinging Jets using RANS Method
- Stress Analysis of Small Scale Coal Gasifier based on Thermal Loading
- Analysis of a Sun Tracker using Linear Actuator to Maximize Heat Collection
- Development of Tilt and Orientation Factor Contours Compensated for Site Specific Requirements
- Studying the Effects of Urinary Tract Obstruction Using Computational Fluid Dynamics
- Investigating the Effect of Wind Loading on Wind Turbine Blade Performance
- Technical & Economical Feasibility of Solar Parabolic Troughs for Industrial Heating

Also listed below are completed and on-going indigenous PhD Projects in Mechanical Engineering Department:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experimental investigation and mathematical modeling of a low energy consuming hybrid desiccant cooling system for hot and humid areas of Pakistan</td>
</tr>
<tr>
<td>2</td>
<td>Pressure and Concentration Gradients in Membrane Feed Channels: Numerical and Experimental Investigations</td>
</tr>
<tr>
<td>3</td>
<td>Modeling and Optimisation of Solar energy Based Thermoelectric Power Generation System</td>
</tr>
</tbody>
</table>
The department is always keen to provide services to industry in the improvement of their projects. It creates strong academic & research linkages between the industry and university.

A summary of recent local industrial projects is given below:

- Dynamic balancing of 1000kg rotor for Crescent Steel
- Impeller balancing for KESC Bin Qasim Plant.
- Rotating mass balancing of turbine impeller for Punjab Engg. Works
- Vibration response of Fan Pulleys for KANUPP.
- Estimation of vibration levels of induced draft fan blowers for SKF
- Precision measures and test systems of turbo super charger for Pakistan railways
- Dynamic response of entrance cone of impeller for KESC.
- Modal analysis of fuel tank for master motors
- Estimation of modal parameters of car chassis for masters motors.
- Development of a mathematical correlation between fatigue crack life of materials operating at their resonance frequency in collaboration with Pakistan Naval Engineering College (PNEC NUST)
- Volume flow rates of household gas pressure for Sui Southern Gas Company

Research linkages with following international universities have been established:

- Edinburgh Napier University, UK
- University of Abertay Dundee, UK
- Sultan Qaboos University, Sultanate of Oman
- University of Malaysia, Malaysia

- University of Waikato, Hamilton, New Zealand
- Auckland University of Technology, New Zealand
- Cranfield University, Bedford, United Kingdom
- Concordia University, Canada
- University of Stuttgart, Stuttgart, Germany

**7.3 RESEARCH AREAS**

Current research interests of the faculty are as follows:

- Renewable and Conventional Energy Systems
- Solar Industrial Process Heating
- Hybrid (Photovoltaic and wind turbine powered) water pumping and desalination system
- Biomass based electrical power system
- Low/Zero Energy Buildings
- Modeling of Energy Systems
- Computational and Experimental Fluid Mechanics
- Direct and Large Eddy CFD Simulations
- Hydraulic Turbines
- Advanced Heat Transfer
- Membrane Desalination
- Control Systems; Mechatronics
- Coal Liquefaction
- Filtration, blending, enrichment, storage and applications of synthetic gas
- Solid and Liquid Desiccant Cooling Systems
- Reliability Studies; Life Assessment
- Statistical Techniques, Design of Experiments, Six Sigma
- Finite Element Analysis
- Characterization and Mechanical Testing of Materials
### 7.4 FACULTY MEMBERS

**Chairman**

Prof. Dr. Mubashir Ali Siddiqui  
*Telephone*  
99261261-8  
Ext. 2206

**Professors**

1. Prof. Dr. Anjum Khalid  
   *B.E (Mech); M.Sc (UK); PhD (NED)*
2. Prof. Dr. –Ing. Naseem Uddin  
   *B.E (Mech); M.Engg (Mech); PhD (Germany)*
3. Prof. Dr. Nasiruddin Shaikh  
   *B.E (Mech); M.Engg (Mech); PhD (Canada)*
4. Prof. Dr. Mubashir Ali Siddiqui  
   *B.E (Mech); M.S (USA); PhD (USA)*

**Associate Professors**

1. Dr. Muhammad Shakaib  
   *B.E (Mech); M.Sc.(Mech); Ph.D (NED)*

**Assistant Professors**

1. Dr. Wahid Irshad  
   *B.Sc; M.Sc. (Electronics); M.Sc. (Mechatronics, UK); PhD (UK)*
8. DEPARTMENT OF INDUTRIAL AND MANUFACTURING ENGINEERING

Industrial and Manufacturing Engineering education has become pivotal in establishing a competitive posture across the entire spectrum of Metal working and Manufactured parts' industry in Pakistan. Both the reality and perception of domestic production points to the need for a stronger, more productive manufacturing industry in this country producing high quality products at low cost. In view of the fast changing technology and scenario the University started this separate Department. Industrial and Manufacturing Engineering spans a broad spectrum of engineering topics such as:

i. Computer Aided Design (CAD),
ii. Computer Aided Manufacturing (CAM),
iii. Computer Integrated Manufacturing (CIM),
iv. Flexible Manufacturing System (FMS),
v. Robotics & Automation; Product Design,
vi. Tools and Machines,
vii. Manufacturing Processes,
viii. Additive Manufacturing,
ix. Quality Engineering,
x. Operations Management,
xi. Maintenance Management,
xii. Supply Chain Management (SCM),
xiii. Modeling and Simulation of Manufacturing & Production,

This Department was initially started under the auspices of Mechanical Engineering Department in October 1999 and started as a separate Department in October 2000 with the name of Industrial & Manufacturing Engineering Department. The Department is offering Master of Engineering (by course work & by Research) with the Specialisations in Manufacturing Engineering and Engineering Management. The Engineering Management program further offers choices of Specialisation in Industrial Management and Quality Management. The Department of Industrial & Manufacturing Engineering has highly qualified and experienced faculty members.

8.1 RESEARCH FACILITIES

Research laboratories are equipped with sophisticated equipment and state of the art software’s. Flexible Manufacturing Cell is in process and soon be available at the Department. Industrial Automation related equipment including PLC’s are available at the Department.

Hardware Facilities

Following are the facilities available in the laboratories;

- CNC Machines:
  - Deckle Maho 50T (multi-axis CNC milling machine)
  - TRAIC PC (3 axis CNC milling machine)
  - Novaturn (2 axis CNC Lathe machine)
  - CNC Wire Electric Discharge Machine (multi-axis -axis)
  - CNC Electric Discharge Machine (Z-axis)
- Reverse Engineering
  - STRATASYS Fused Deposition Modeling Machine
  - FARO ARM Portable CMM
  - LASER SCANNER for scanning 3D parts
- Automation & Controls:
  - Programmable Logic Controllers,
  - Robotic arms,
  - Various types of transducers and sensors.
- Automatic Injection Molding Machine

- Conventional Metrology instruments:
  - Surface plates,
  - Gauge blocks,
  - Profile projector,
  - Contourmatic profiling Machine

Software Facilities

The department has the following software available in the computation laboratories;

- CAD/CAM/CAE software including Pro Engineer, Unigraphics, CATIA and ANSYS. Along with that Software for Statistics/Decision Making/Simulation including Minitab, Matlab & Simulink, Witness 12, Microsoft Project, POM for Windows, RCM ++, and Microsoft Visual Studio are also available.

8.2 RESEARCH AREAS

The current research interests of the Department are as follows:

- Composite Material
- Metal Machining & Forming Processes
  - High Speed Machining Process
  - Modeling of Metal Cutting & Forming Processes
  - Non Traditional Machining Processes
  - Application of Finite Element Modeling and Analysis in the manufacturing operations.

- Operations Management
  - Project Life-Cycles;
  - Project Risk Management;
  - Earned Value Analysis and Improvements;
  - Monte Carlo Simulations in Industrial Engineering;
  - Project Evaluation & Feasibility Analysis;
  - Project Planning;
  - Global and Shared Projects;
  - Project Management Best Practices versus domestic applications
  - Flow Shop Scheduling;
  - Line Balancing;
  - Job Shop Scheduling;
  - Inventory Management;
  - Forecasting;
  - Supply Chain Management;
  - Supply Chain Performance Evaluation;
  - Developing & managing supply chains in developing markets;
  - ERP best practices versus domestic requirements and cultural perspectives;
  - Business Process Re-engineering;
  - Business Process Simulation;
  - Supplier evaluation frameworks;
  - Work Study & Measurement;
  - Technology & Innovation Management;
– New Product Development
– Cost of Quality (CoQ);
– Total Quality Management (TQM);
– Six Sigma in developing countries;
– Six Sigma in service sectors especially Academia;
– Design of Experiment (DOE);
– ISO and service quality especially Academia;
– Quality Control Tools and improvements;
– Measurement System Analysis (MSA) and improvements
• Computer Aided Design & Manufacturing (CAD/CAM)
– High precision NURBS tool path generation for three and five-axis CNC machining.
– Generation of planar and space offset curves with global error control
– Computer aided process planning
– Design and kinematics modeling of multi-axis CNC machines.
– Design and analysis of metal cutting tools.
– Accurate surface modeling of hypoid and spiral bevel gears.
– Cutting force analysis of different metal cutting processes.
– Optimization of machining parameters during the metal cutting processes.
– Optimization of cutting tool geometry.
– Optimization of tool design and process parameter of composite machining.
– Optimization of work piece setup parameters for the multi-axis CNC milling.
• Additive Manufacturing
– Innovative additive manufacturing (3D printing) processes
– Novel materials for processing on additive manufacturing equipment
• Maintenance Management
– Total Productive Maintenance; Productivity/process improvement via lean and allied methodologies
– Implementation/benchmarking of Maintenance Management techniques
– Development of Computerized Maintenance Management Systems
• Supply Chain Management
– New Product Development Integration with Supply Chain
– Integrated Extended Enterprise at all the levels.
– Decision Making Points Analysis in Enterprise
– Supply Chain Business Process Simulation
– Strategic Management in Supply Chain
– Bullwhip Effect Analysis in Distribution Network
– Performance Measurement in Supply Chain.
– Feasibility Analysis in Supplier Selection Process.
– Market Development or Penetration in
Supply Chain.

8.3 FACULTY MEMBERS

Chairperson
Prof. Dr. Syed Amir Iqbal

Professors
1. Prof. Dr. Muhammad Tufail
   B.E. (Mech); M.Sc (UK); Ph.D. (UK);
   Mem. ASME; Assoc. Mem. IMechE;
   Mem. ASM; PEC

2. Prof. Dr. Syed Amir Iqbal
   B.E. (Mech); M.E. (Mech.);
   Ph.D. (UK); Member PEC

Associate Professors
1. Dr. Rameez Khalid
   B.E. (Mech); M.S. (France);
   Ph.D. (France); Member ISM, PMI, ASQ, PEC

2. Dr. Maqsood Ahmed Khan
   B.E. (Mech); M.E. (Mech);
   Ph.D. (Canada); Member ASME, PEC

3. Dr. Muhammad Fahad
   B.E. (Ind. & Mfg.); M.Sc. (UK);
   Ph.D. (UK); Member PEC

Assistant Professors
1. Dr. Muhammad Wasif
   B.E. (Mech); M.E. (Mech);
   Ph.D. (Canada); Member ASME, PEC

2. Dr. Syed Mehmood Hasan
   B.E., (Ind. & Mfg.); M.Sc. (UK);
   PhD (UK); Member ASME, SME, PEC

3. Dr. Aqeel Ahmed
   B.E. (Mech); M.E. (Mech.);
   PhD (Canada); Member PEC
9 DEPARTMENT OF TEXTILE ENGINEERING

INTRODUCTION

Textile Engineering Department was established in 1996 with the aim to provide quality education in the field of Textile Engineering. The first Batch of Textile Engineers passed out in 2001. We are providing quality education to our students. Our graduates are serving the Textile Industry of Pakistan in different capacities for the last 12 years.

Our undergraduate program is very well established. Textile Engineering Department has started the Postgraduate program i.e. M. Engg in Textiles 2005 and we have also started our MEM in Textile Management in 2010. These programs are also running successfully. The principal objective of these programs is to equip the students with the latest knowledge in the area of Textile Engineering. By the knowledge obtained during their studies the students should be able to manage the textile industry and also should be able to understand and solve the problems of textile industry in which they are employed.

The Department actively collaborates with the local textile industry to solve their problems by conducting different projects at students and faculty member level. We intend to start our Ph.D. program as per the policy of the university.

Ph.D. program of our department is aimed at outstanding young textile engineers who want to continue their career in academia and textile industry. In the modern era in order to export the goods and meet the compliance criteria of well-known buyers, the industry is facing an uphill task of establishing R & D culture.

Our Ph.D. program would enable the students to gain high quality doctoral qualification and also they will develop an understanding of technology driven business they would be able to innovate and respond to the challenges faced during product and process development.

During this program, students will gain experience by working closely with collaborating industrial R & D teams. During the degree the students will be placed in an industry to conduct the research for a significant time period.

9.1 LABORATORY FACILITIES

We have fully equipped lab facilities for manufacturing yarn and fabrics. We have also got facilities for wet processing of fabrics. The textile machinery present in our labs are as follows:

![Laboratory equipment image]
i. Machines for yarn manufacturing from Carding to Cone Winding
ii. Machines for fabric manufacturing which includes Hand loom Rapier loom Air jet loom and Projectile loom
iii. Machines for the fabric dyeing such as winch and jigger
iv. Lab scale facilities for continuous dyeing and printing
v. Fibre yarn and fabric testing equipment

The textile machinery present in the department could be used for manufacturing different types of fabrics and yarns. Most of these machines are of industrial scale so they can be easily used for conducting research work.

9.2 RESEARCH AREAS

Looking at the expertise of our faculty members and the facilities available in the department, we can cover the following research areas:

i. Yarn manufacturing
ii. Fabric manufacturing
iii. Dyeing and finishing of fabrics
iv. Textile coloration
v. Textile composites
vi. Textile printing

9.3 FACULTY MEMBERS

Professor
Prof. Dr. Khalid Pasha
B.Sc (Hons)
M. Sc. (Chemistry)
Ph.D. (Textile, UMIST, UK)

Associate Professors
1. Dr. Sheraz H. Siddique
B.E. (Textile)
M. Sc. (Textile & Clothing Management, Germany)
Ph.D. (Textile, UK)

2. Dr. Salma Farooq
B.Sc (Textile Engg.)
M. Engg. (Textile)
Ph.D. (Textile, Heriot Watt Uni., UK)

3. Dr. Bilal Zahid
B.E. (Textile); M.Engg. (Textile);
Ph.D (Textile, University of Manchester, UK)

4. Dr. Fareha Asim
B.E. (Textile); M.Engg. (Textile);
Ph.D. (Textile) NED
Assistant Professors

1. Dr. Shenela Naqvi  
   B.E. (Textile); M.Engg. (Textile);  
   Ph.D. (Textile, University of Manchester, UK)

2. Dr. Muhammad Dawood Hussain  
   B.E. (Textile); M.Engg. (Textile);  
   Ph.D. (Textile, University of Manchester, UK)

3. Dr. Ali Hassan Mahmood  
   B.E. (Textile); M.Engg. (Textile);  
   Ph.D. (Textile, University of Manchester, UK)

4. Dr. Agha Deedar Hussain  
   B.Sc. (Textile Engg); M.Engg. (Textile);  
   Ph.D. (Textile, UK)
10 DEPARTMENT OF ELECTRICAL ENGINEERING

INTRODUCTION

The Department of Electrical Engineering is rich both in its history. The undergraduate program in Electrical Engineering traces back many decades and its alumni have been active in social and professional activities around the world. The Department of Electrical Engineering has contributed in the development of three other engineering disciplines at NED University namely, Computer and Information Systems, Electronic and Telecommunications Engineering.

The Department also holds a strong post-graduate setup. A M.Sc. Degree Programme in Electrical Engineering has been offered by this Department since 1984. The program has seen several modifications and is currently offered as a semester based M.Engg. Degree Programme in two specializations: Electrical Power Systems and Energy Management.

The Department of Electrical Engineering also holds the honour to supervise and award the first PhD at NED University. It encourages research right from the undergraduate Final Year projects, which support Masters level Dissertations and Independent Study Projects, ultimately contributing towards PhD projects. Currently, senior faculty is involved in supervising both PhD and Master level projects in cutting edge areas of Electrical Engineering.

10.1 RESEARCH FACILITIES

Laboratory Facilities

The Department of Electrical Engineering has nice blend of field experience and higher education in diverse fields of Electrical Engineering specializations. The laboratories at Department of Electrical Engineering are equipped with latest technical simulation software and instrumentation equipment to facilitate research in Power Systems Wide Area Monitoring and Control, Protection, Stability, Transients Analysis, State Estimation, Smart Grid Technologies, Phasor Measurement Technologies, Joint Time Frequency Analysis, Language and Speech Signal Processing, Information Visualization, Current-mode circuits and filters. The Department also offers dedicated research area with excellent facilities for researchers.

Excellent facilities to perform specific research in areas of Signal Processing, Power Systems and Controls are available.
Computing and Allied Facilities

The Department has two Computer labs, capable of performing high end simulations. Latest technical software is installed including MATLAB, PSSE and ETAP. The computers are networked with internet access.

A list of recent PhD and Master Projects successfully undertaken is:

i. Power System Protection Coordination Prevalent and Recommended in Karachi
ii. Developing Unit Commitment Algorithm Considering National Power Constraints
iii. Modeling Pakistan's Power Sector Policies by Demand and Supply Forecasting
iv. The Study of Proper Placement Selection and Sizing of Roof Top Wind Turbines for Local Household Electricity Generation
v. Optimum Placement of Power Factor Improvement Devices to Improve Voltage Stability Synchronphasor Technology
vi. Statistical Analysis of Synchronphasor Data
vii. Preprocessing Algorithms for Arabic Speech Recognition
viii. Improved Design of Phasor Measurement Unit as per IEEE C37.118.1 Standard using Simulink
ix. Analysis of Switching Transients in Integrated Power System
x. Synchronization of Power System Data with GIS Maps
xi. Line to Ground Fault Study of KESC EHT Transmission Network
xii. Development of Audio Content based Search Techniques

10.2 ACADEMIC AND INDUSTRIAL LINKAGES

Research flourishes through collaboration, linkages and outreach. The Department of Electrical Engineering recognizes the importance of creating and sustaining strong relationships with others. While academic linkages enhance creation of knowledge, industrial relations boost application. Both are important for keeping research socially relevant.

The Department has developed contacts with several international universities, including Michigan Tech University, USA, Brunel University, UK, GIST, Korea, Universiti Malaya, UniversitiSains Malaysia, King Fahad University of Petroleum and Minerals, Saudi Arabia, KTH Royal Institute of Technology, Sweden.

The Department also engages actively with industries to contribute towards addressing problems indigenously. Projects have been undertaken with leading industries such as Siemens, PIA, Pakistan Steel Mills, KANUPP, Areva, and Asia Petroleum.
Several initiatives taken by the Department with KESC have resulted in signing of a formal MOU of Strategic Collaboration between NED University and KESC. Additionally, the two institutes are now actively engaged in area of Energy Management which has resulted in a project proposal to transform NED University into first Green Campus of Pakistan.

10.3 THEMATIC RESEARCH

The Department is currently encouraging research proposals under following research themes:

Wide Area Monitoring and Control: Wide area monitoring and control is now possible using PMUs (Phasor Measurement Units), which are also available in advance meters and relays. Phasor measurements can be used for monitoring of whole (wide) of the network. This is an emerging field of research in Power Systems.

Advanced Power System Protection: Reliable Phasor measurements are now available in real time from main points of the grid, which are then utilized to address advanced power system protection strategies.

Power System Stability: Voltage and Angle Stability are important aspects of Power System to have equilibrium between the load and generation, it has become more important to study in context of the rapidly changing power grid nowadays.

Power System Transients Analysis: Several Power Systems myths and mysteries are addressed by performing transient analysis on Power System Models.

Power System State Estimation: Availability of real time power systems data has opened a new field of research for more accurate and instantaneous Power System estimation, which will be beneficial to improve power system stability and blackout avoidance.

Black out avoidance Strategies: Wide Area Monitoring and Control techniques using Phasor measurements have provided an opportunity to develop new strategies to avoid blackouts.

Smart Grid Technologies: Different Smart Grid Technologies are being rapidly developed around world. There is a great research opportunity to not only develop the technologies and applications as well.

Phasor Measurement Technologies: This technology is in rapid development phase to be as accurate as possible because this is the basic building block of SychroPhasor Technology.

Joint Time Frequency Analysis: The study is to develop and apply tools which can present signals in a domain where instantaneous time and frequency information is jointly available. The applications vary widely: such as power systems, communication systems, biomedical imaging, image processing.

Language and Speech Signal Processing: One of the initial aims of Artificial Intelligence is to enable computers to produce and comprehend human languages - spoken as well as written - in order to communicate with
us; in the way we do to each other. This is an interdisciplinary area and is widely known as computational linguistics. The area requires expertise in Physics, Signal processing, Pattern recognition, Communication and Information theory, linguistics, physiology and computer science.

Information Visualization: This field deals with large amount of data represented in such a fashion which supports decision making. This is again an interdisciplinary area of Data Acquisition, Computer Science and Data Mining.

Current mode circuits and Filters: Current/Voltage mode integrable filter circuits with convenient tunability of the filter parameters having low sensitivity and reduced number of component counts, and extended frequency range will be developed and investigated using special ICs, such as OTS, OAs, NICs, CCC-I & II, etc. Also, component matching technique may be utilized to reduce component counts. Moreover, Active only current mode filter circuits may also be developed and investigated in the PhD Projects.

10.4 FACULTY MEMBERS

Professors
1. Prof. Dr. Talat Altaf
   B.Sc.Engg.(Hons); M.Sc.(Elect.) (Aligarh); Ph.D (UK),

2. Prof. Dr. Saad Ahmed Qazi
   B.E.(Elect.); M.Sc. (Lancaster, U.K.); Ph.D (Brunel, UK),

Associate Professor
Dr. Muhammad Ali Memon
B.E.(Electrical); M.Engg.(TC) NEDUET; MBA (MIS); Ph.D (USA)

Assistant Professors:
Dr. Abdul Ghani Abro
B.E.(Electrical); M.Engg.(EE) NEDUET, Ph.D. Malaysia
11. DEPARTMENT OF COMPUTER AND INFORMATION SYSTEMS ENGINEERING

Computer engineering is an integration of various fields of Computer Science and Electrical Engineering required for developing computer software and hardware. The programme of Computer Systems Engineering started at NED University in 1984 to address these needs. As the discipline got advanced, later on, a separate department was established in 1997 named as Department of Computer and Information Systems Engineering. The Department has both Undergraduate and Postgraduate programmes. At undergraduate level the Department has been offering four-year Bachelor of Engineering (Computer and Information Systems Engineering) programme. Students are taught Software design, Hardware Software integration, Computer Networking, Embedded system design, Robotics, VLSI chip design, Database management and many other interdisciplinary courses. The good reputation of the university and the department has always attracted many prospective employers, both foreign and local.

At post graduate level, the department offers Master of Engineering (Computer Systems) and PhD (Computer Engineering) programmes. At Master’s level there are two areas of specialization offered by the department namely; Computer Architecture & Systems Design and Computer Networks & Performance Evaluation.

The department has four full time PhD faculty members and currently five more are at different stages of their PhD research, mostly abroad. Since its inception the department has produced two PhD graduates and one PhD scholar is in her final stages of completion.

11.1 RESEARCH FACILITIES

Laboratories

Computer Networks Laboratory

Computer Networks Laboratory is equipped with latest routers and network simulation software. Laboratory sessions of courses related to Computer Communication Networks, Internet Computing, and Digital Communication Systems are conducted here.

Artificial Intelligence and Robotics Laboratory

Artificial Intelligence & Robotics Lab fulfills the needs of the department by supporting the laboratory sessions related to the courses of artificial intelligence and robotics. The lab is equipped with latest Intel i7 machines and a variety of Robotic arms and Boe-bot Robots. The Robotic equipment is utilized by undergraduate and post graduate students for their research and development projects.
Parallel Processing Laboratory

This laboratory fulfills high performance computational needs of the department. At present Parallel Processing lab has latest servers, which act as ORACLE and OPNET servers. The lab also has a four-node (PIV) Beowulf cluster, connected via 100Mb/s Star topology which is used for high end computing. It is Linux based and uses "MPICH" as cluster management software. Moreover, the user and resource administration is being done using "OpenPBS". "NAS Parallel Benchmark" is also installed on this cluster.

Microprocessor Laboratories I and II

To support a wide variety of student laboratory sessions and research projects related to microprocessor design and implementation, there are two dedicated laboratories in the Department.

Logic Design and Switching Theory Laboratory

This laboratory supports the undergraduate and post graduate research and development projects related to digital hardware design and implementation. It is equipped with all the necessary trainer boards, off-the-shelf hardware components, circuit fabrication kits etc. that can be utilized by the students.

Research Laboratory

CIS Department has a Research Laboratory that can accommodate 6 to 8 research scholars. This laboratory can support necessary computing and network requirements of the research scholars round the clock. This research lab is equipped with a latest state-of-the-art 48 nodes cluster facility with Linux as core operating system.

Facilities to support research at post graduate level

- The Research Laboratory has the basic infrastructure to support post graduate level research projects. Necessary computing and network support is already present.
- Parallel Processing Laboratory in the department is also equipped with a smaller cluster system utilizing MPICH protocol and Linux operating system.
- The department also has the facilities to support high performance GPGPU computing. The department is in the process of implementing its own GPGPU cluster.
- The department has digital signal processing equipment comprising DSP processor and FPGA based electronic development kits. The department also has the necessary software to support these hardware.
11.2 POST GRADUATE RESEARCH

Research has always been an area of paramount importance to CIS. The University also encourages research by faculty members & provides incentives for research output in the form of publications. The department is actively involved in research at postgraduate level in conventional and emerging areas of Computer Engineering.

11.3 RESEARCH AREAS

The Department currently offers PhD positions in following research areas:

- Computer Architecture
- Distributed Systems and Computer Networks
- High Performance Computing
- Multicore Processing
- VLSI Design and Testing
- IC Design
- Mixed Signal Circuits
- Digital Signal Processing Systems
- Reliable System Design
- Intelligent Embedded Systems

11.4 FACULTY MEMBERS

**Professors**

1. Prof. Dr. Qurat-ul-Ain Tariq  
   (On leave)  
   B.E. (Comp Sys.); M.Engg.(Comp Sys.); Ph.D. (Distributed System)  
   University of Newcastle, UK.

**Associate Professors**

1. Dr.-Ing Shehzad Hasan  
   B.E. (Comp Sys.); M.Engg. (Comp Sys.); Ph.D. (IC Testing) University of Bremen (Germany)

2. Dr. Muhammad Ali Ismail  
   B.E. (Comp Sys.); M.Engg. (Comp Sys.)  
   Ph.D. (Computer Engg.) NED  
   Member: IEEE(USA); IET(UK), ACM

3. Dr. Muhammad Khurram  
   B.E. (Comp. Sys.); M.Engg. (Comp. Sys.)  
   Ph.D. (IC Design) Massey University (New Zealand)
12 DEPARTMENT OF ELECTRONIC ENGINEERING


The Department of Electronic Engineering, established in 1999, currently offers Bachelor of Engineering degree in Electronic and Telecommunication Engineering, Master of Engineering Degree in three specializations namely Micro-system Design, Industrial Electronics, and Telecommunication Engineering.

12.1 RESEARCH FACILITIES

The Electronic Engineering Department possesses research facilities to conduct the PhD research such as course work, simulations and collaborative research. The department possesses the faculty, buildings and equipment to initiate and complete the research projects. There are various laboratories to support PhD research. The department is well equipped with necessary tools and equipment to undertake cutting-edge research in allied areas. The Department has active collaborations with research groups in USA, Sweden, Netherlands, Turkey, and Malaysia.

Research Groups

The Department of Electronic Engineering is actively involved in the research activities related to Electronic and Telecommunication engineering. Our faculty and scholars published various research articles in world-class, high impact factor journals such as IEEE transactions, IET journals, Physical Review B, Journal of Applied Physics, Applied Physics Letters, Bio Sensors and Bio electronics, sensors and Actuators B, Progress in Electromagnetic Research B, Sensors Journal, Journal of Optical Society of America B, etc. Department’s research activities have been recognized by international bodies and leading journals such as, Nature Photonics, Optics and Photonics News, Sensors Journal, and Micro Nano Letter (IET journal). Three articles have won best paper awards by respective publishers in 2013.
Various research groups working in the department are:

- Nano-technology group
- Wireless systems group
- Antenna design group
- Robotics group
- RF devices group

Research Projects

Some of the research projects are:

- Flexible and adaptive wide band power amplifiers for transmitters
- Novel technique for performance improvement of cognitive radio
- Flexible low noise amplifier for software defined radio
- Design & development of a slotline microstrip based stack patch antenna with probe fed feeding mechanism.
- Analysis of u-shaped microstrip patch antenna 8x1 array after introduction of CSRRs, fractal structure and stacking, independently and cumulatively.
- Wide bandgap semiconductor based electronic and photonic devices
- Electrical characterization of semiconductor devices
- Design of high efficiency class-E power amplifier using cadence

- Investigation of interface scenario between geostationary satellites using ITU database
- Performance analysis of nonlinear pre-coding in multi-user MIMO system.
- Activity recognition in kitchen using image processing.
- Implementation of contour let transform for image processing.
- Resource allocation for MIMO cognitive radio systems using game theory.
- Power optimization in cognitive radio networks: a game theoretical approach.
- Secure network management of a wireless sensor network using customized SNMPv2c.
- Designing of high efficiency class e amplifier in CMOS technology using cadence.
- Designing and study of micro scaled (CMOS devices)
- General bi-quadratic active RC filter circuit using negative impedance convertor
- Non-linear controller design for electrical power system of power plant.
- Model optimization and adaptive PID control synthesis of electrical power system for a power plant.
Laboratory Facilities

The Department possesses various laboratories related to electronic and telecommunication engineering well-equipped with state-of-the-art equipment to facilities research activities in the department. For instance, The Device Characterization (DC) lab is a multi-purpose laboratory for on-wafer semiconductor device characterization and integrated circuit testing. The laboratory is equipped with advanced equipment for characterizing electronic devices, power devices, and integrated circuits. Radio Frequency (RF) lab is equipped with advanced equipment for measurement of RF and Microwave circuits. PCB lab has necessary facilities to fabricate industrial-grade PCBs and provided necessary testing. The department also possesses programmable logic controllers, VLSI testing facility, and necessary equipment for power electronics.

Telecommunication laboratories possesses personal handheld system/wireless local loop (PHS/WLL) that can serve as test-bed for researchers. Other telecommunication laboratories possess necessary support for wireless channel sounding, antenna testing and characterization, signal processing tools, etc. The equipment include, but not limited to vector network analyser, noise source, vector signal generator, vector signal analyser, RF probe head, signal generators, spectrum analyser etc.

Research Linkages

Various linkages to support research activities in the department include:
- Linkoping’s University (LiU), Sweden
- University of Sains (USM), Malaysia
- Middle East Technical University (METU), Turkey
- NXP Semiconductors/ Delft University of Technology, Netherlands
- King Abdul Aziz University of Science and Technology, Saudi Arabia

Research Interests

The Department intends to pursue research in following areas:
- Solid state devices system
- VLSI design and fabrication, test and reliability
- Micro fabrication
- Nano-technology
- Nano-materials and Nano-devices
- Micro-electro-mechanical system
- Optoelectronics integrated circuits
- Laser and optical fiber
- Instrumentation and calibration
- Mechatronics
- Power electronics, industrial electronics
- Embedded system design
- Digital and analog signal processing
- Fuzzy logic and intelligent control systems
- Radio frequency integrated circuits
- Electromagnetic Metamaterials
- Wireless communications
- Wireless local positioning system
- Cognitive radios
- Antenna design
- Antenna arrays
- Green communications
- Optical devices and networks
- Communication networks
- Microwave systems
- Robotics
12.2 FACULTY MEMBERS

Chairman
Dr. Ghous Bakhsh Narejo
Telephone Office
99261261-68
Ext. 2270

Co-Chairman (Electronic)
Dr. Ghous Bakhsh Narejo
99261261-68
Ext. 2215

Co-Chairman (Telecommunications)
Dr. Muhammad Imran Aslam
99261261-68
Ext. 2671

Professor
Prof. Dr. Attaullah Khawaja
B.E. (Electrical); Mehran University,
M.Engg. (Electrical) NED University,
PhD (Comm.&Info.Systems);
BIT P.R.China

Associate Professors
1. Dr. Ghous Bakhsh Narejo
B.E. (Electronic); Mehran University
M.Engg. (Electronic); NED University
Ph.D. (Electrical Engineering); Michigan Tech, USA.

2. Dr. Muhammad Imran Aslam
B.E. (Electrical); NED University
M.Engg. (Electrical); NED University
Ph.D. (Electrical Engineering); Michigan Tech, USA.

3. Dr. Irfan Ahmed
B.E. (Electrical); NED University
M.Engg. (Electrical); NED University
Ph.D. (Electrical Engineering); Michigan Tech, USA.

4. Dr. Adeel Razi
B.E. (Electrical); NED University
M.Sc. (Communications Engg.); Germany
Ph.D. (Electrical Engg.); UNSW, Australia

Assistant Professor
1. Dr. Syed Muhammad Usman Ali Shah
B.E. (Electronic); NED University
M.Sc. (Electrical); NED University
Ph.D. (Electronic Engg.); Linkoping University, Sweden

2. Dr. Sadia Muniza Faraz
B.E. (Electrical); NED University
M.Engg. (Electronic); NED University
Ph.D. (Electronic Engg.); NED University

3. Dr. Syed Riaz un Nabi Jafari
B.E. (Electronic); IIEE-NED University
M.Engg. (Electronic); NED University
Ph.D. (Robotics); IIT-University of Genova, Italy.
13. DEPARTMENT OF MATERIALS ENGINEERING

INTRODUCTION:
The evolution and development of materials had led to the development of human cultures and industries. Every product is an aggregate of materials made in various types. Materials Engineering is an interdisciplinary field that addresses the structure, processing, and property relationships in materials for engineering applications. Basic principles of chemistry and physics are applied to provide an understanding of the structure of materials and the manner in which the structure governs the properties. Engineering processing methods are then applied to yield the necessary properties, which then can be integrated with, and designed to accommodate the needs of modern technology.

In particular, as an academic field with great industrial fundamentality and importance, it has a large ripple effect on all industries as well as a very broad and intensive scope of study.

The Department of Materials Engineering offers both practical and theoretical curricula on metals and alloys, ceramics, semiconductors, polymers, glasses, composites, biomaterials, and recently developed nano-materials.

The Department is headed by Professor Dr. Ashraf Ali (having Thirty Two (32) years of Research Experience) and supported by well experienced faculty members. Teaching staff is also supported with a skilful technical staff for laboratory handling and rapidly growing technical facilities. For enhancing practical knowledge of students a number of experienced visiting faculty members have also been employed from renowned organizations related to Materials Engineering.

The Department of Materials Engineering too, has modern teaching facilities and state of the art laboratories having equipment related to every field of materials engineering to complement its extensive in-class teaching, such as, but not limited to Processing and Characterisation of Materials and its synthesis etc.

The Department of Materials Engineering was established in 2006 at NED University, and is offering programmes for the award of Bachelor, Master and Doctor of Philosophy (Ph.D.) degrees in the field of Materials Engineering. The Ph.D. in Department of Materials Engineering is a cutting-edge program, employing state-of-the-art analytical materials instrumentation not found anywhere else in the city. This program promotes the synergistic interaction of industrially focused research efforts of faculty, students, and commercial partners leading to economic and engineering development of the region. The Ph. D. program is specifically targeted at producing graduates who can find employment as an industrial research scientist or engineer.

13.1 RESEARCH FACILITIES:

The Department has established state-of-the-art laboratory facilities containing both conventional and sophisticated advanced equipment. Students utilise these equipment for the examination, characterisation and evaluation of properties of both conventional and advanced engineering materials.

The department has following fully functional state of the art laboratories for Ph. D research:

(i) **Metallography Laboratory**
- Optical Microscopy Laboratory with the facilities of magnification range from 1x to 24000x

(ii) **Scanning Electron Microscopy Laboratory (SEM with EDX)**
- SEM with 150,000x magnification is available in this laboratory.

(iii) **X-Ray Diffraction (XRD) Laboratory**
- XRD with θ - θ geometry complete with computerised phase analysis and crystallography software.
(iv) **Mechanical Testing Laboratory:** This laboratory is equipped with Universal Tensile Test Machine, 300kN and 50kN which can also be used for in-situ measurement of mechanical properties with heating up to 800 °C. Along with that Charpy impact Tester, 150, 250 and 500 J and hardness testing facilities including Brinell, Rockwell, Vickers, Knoop, Shore, Portable, Micro hardness Tester are also available in this laboratory.

(v) **Heat Treatment Laboratory:** Facilities like Box and Tube Type Air Muffle/Atmosphere Furnaces, Air and Vacuum Ovens, High Temperature Sintering Furnace, Induction Hardening covering temperature range from 30 to 1600 °C are available in this laboratory.

(vi) **Corrosion Laboratory:** This laboratory is equipped with Computerised Potentiostate, Corrosion Cells and Cathodic Protection.

In addition to above laboratories, the Department also has facilities for research on thermal analysis of materials, magnetic materials, phase transformations in materials, composites materials, surface engineering of materials, Coating Characterisation, NDT of Materials, Nanomaterials and Biomaterials.

13.2 **RESEARCH AREAS:**

13.3 FACULTY MEMBERS:

Professors
1. Prof. Dr. Muhammad Tufail  
   B.E. (Mech); M.Sc. (UK); Ph.D. (UK);  
   Mem. ASME; Asso. Mem. I MechE;  
   Mem. ASM; Mem. PEC

2. Prof. Dr. Ashraf Ali  
   B.E. (Metallurgical Engg.) NED;  
   Ph.D. (Metallurgy and Materials Science) Cambridge University, UK

3. Prof. Dr. Kausar Ali Syed  
   Ph.D. (Polymer Science)  
   University of Louis Pasteur, Strasbourg, France

4. Dr. -Ing. Umair Alam  
   B.E. (Textile) NED;  
   M.E. (Quality, Safety & Env.) Germany;  
   Ph.D. (Heat Transfer, Materials) Germany

5. Dr. Syed Imran Ali  
   Ph.D. (Polymer Tech.) Eindhoven University of Technology, The Netherlands

6. Dr. Rafiq Ahmed  
   B.Sc. (Hons, Applied Chemistry, K.U)  
   M.Sc. (Applied Chemistry, K.U)  
   PhD. (Polymer Technology, The Netherlands)
14. DEPARTMENT OF BIO-MEDICAL ENGINEERING

INTRODUCTION

Focusing on the challenges created by the diversity and complexity of living systems that require knowledgeable and innovative people that keep the expertise of science, medicine and mathematics to solve biological and medical problems and to monitor, restore and enhance normal body functioning, keeping the pace with world in innovative technologies and research, NED UET has started its five year Bio Medical Engineering program, seven years back. To make the students able to integrate biology and medicine with engineering to solve problems related to living systems, traditional engineering along with Biomechanics, Biosensors, Bio-MEMS / Nanotechnology, Bioinstrumentation, Medical Imaging and Scanning, Biomedical Signal Processing and Systems Analysis are included in biomedical engineering curriculum. As the most emerging field of Engineering, Bio medical Engineers are supposed to be the highly paid engineers. Aimed to achieve international competitiveness and compatibility, department is ISO 9001certified.

Established in 2006, The Department of Bio-Medical Engineering offers five-year bachelor degree programme leading to Bachelor of Bio-Medical Engineering (Bio stream and Medical Stream). Three batches have been passed out so far and the graduates are serving in well reputed organizations, both in Pakistan and abroad. Level of final year projects reflects high academic and research involvement, and appeared to be valuable to the concerned fields particularly in hospitals. In 2011, the department also started its Masters programme and currently three batches are pursuing their Masters Courses.

14.1 RESEARCH AREAS

Holding the well-equipped laboratory facilities and qualified faculty members, department is now offering PhD by research in the following areas:

- Biomechanics
- Human Movements
- Human Gait Analysis
- Gait Changes in Diabetic Patients
- Osteoarthritis and Gait
- Orthopedic Surgeries and Postoperative Gait Changes
- Diabetes Foot Biomechanics
- Orthopedic Biomechanics
- Stroke Patients Management
- Sports Medicine and Training
- Prosthesis Designing
- Tissue Engineering
- Biotechnology
- Neurosciences
- Biochemistry / Molecular Biochemistry
- Robotics

14.2 RESEARCH FACILITIES

Three key labs in the department are;

- Movement Analysis/ Gait Analysis Lab

First of its kind laboratory in Pakistan, the movement analysis/ Gait Lab is an state of art laboratory equipped with highly advanced and computerized eight motion cameras and three force plates capable to capture the three dimensional motion of the subjects/patients.

The motion analysis laboratory can be used as an institution for studying the various aspects of human motions and for conducting the researches related with motion. The applications of three dimensional (3D) analysis of human motion are very vast. Analysis of gait of the patients with cerebral palsy, diabetes, stroke, hip joint replacement and knee joint replacement are few of the examples where 3D motion analysis can be used for assessments of the abnormalities in the gait (walking) patterns of these patients. The gait analysis is a well-recognized tool for assessing the outcomes of many surgical procedures and medical treatment. The 3D
movement analysis can also be used in sport medicine and sports training purposes.

- **Robotics Laboratory**
  
  Robotics lab is functional carrying Robotic Manipulator and a Mobile Robot Platform (PeopleBOT).

- **Tissue Engineering Laboratory**
  
  Lab is equipped with Advance Automatic Tissue Processor, Tissue Embedding Station, Rotary Microtome and Centrifuge Machine.

**Computing Facility**

Department housed two modern computer labs with 35 working stations with multimedia, scanning and printing facilities.

14.3 **ACADEMIC AND INDUSTRIAL RESEARCH ENDEAVORS AND COLLABORATIONS**

Besides aMoU with Dow University of Health Sciences, department has collaboration with other reputed institutes as well. Students are sent for summer internship in third year and at extensive training program in final semester at different places and institutes including:

- Sindh Institute of Urology and Transplantation (SIUT)
- KIRAN
- Ziauddin Hospital (North Nazimabad and Clifton)
- Aga Khan University Hospital
- The INDUS Hospital
- Liaquat National Hospital
- Analytical Measuring Systems Pvt. Ltd.
- National Center for Proteomics, University of Karachi
- Dr. A. Q. Khan Institute of Biotechnology & Genetic Engineering, University of Karachi
- The Kidney Centre
- Dow Diagnostic and Research Laboratory (OJHA Campus)
- DarulSehat Hospital
- Tabba Heart Institute

International scholarships are also availed by the students including Erasmus Mandus Scholarship.
14.4 FACULTY MEMBERS

Biomedical engineering department (LEJ campus) has the following qualified PhD faculty with both the medical and engineering background:

Professors
1. Prof. Dr. Ali Raza Jafri  
   B.E. (Mech) NEDUET;  
   M.Engg. (Mech) NEDUET;  
   Ph.D. (Mechatronics) (BIT, China)

2. Prof. Dr. Farzana Yasmin  
   Ph.D. (Biochemistry); UoK;  
   Post-Doctorate; State University of New York, USA

Assistant Professors
1. Dr. Abu Zeeshan Bari  
   B.E. (Mech) NEDUET;  
   M.Engg. (Mech) NEDUET  
   Ph.D. (Dynamics of Prosthetic Feet)  
   University of Salford, UK

2. Dr. Syed M. Wasim Raza  
   M.B.B.S., PGDPA, MAS  
   Ph.D. (Bio-Medical) University of Dundee, UK
15. DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

INTRODUCTION

The Department of Computer Science & Information Technology (CSIT) has been conducting a successful 4-year Bachelor of Computer Science & Information Technology (BCIT) programme producing computing professionals with the first batch graduating in 2003. BCIT graduates are recognised, well perceived and sought after by the Information Technology industry. The demand for Computer Science & IT graduates in the growing IT industry continues to multiply, providing excellent prospects with professionals with high quality skill sets. To augment the academic level of professionals and enhance the quality of their IT skills, the Master of Computer Science & Information Technology (MCIT) Post Graduate Programme was initiated in 2003. The programme covers most areas of Computer Science, OT, Telecommunication and Management accepted as state-of-the-art and are in demand by computing professionals today, and are helping in furthering their career prospects.

To keep abreast of the fast paced developments in the computing field, The Department maintains a highly qualified Faculty conducting research in broad computing themes, and offers opportunities for postgraduate research leading to a PhD in Computer Science. The Faculty has research expertise in major areas of Computer Science, and invites interest from highly motivated and well-qualified graduates to work towards a doctorate. Though Computer Science and its application across all the sciences is currently revolutionising a wide range of human activities, it itself is undergoing revolutionary change. The Department positions itself to anticipate and drive these developments in all major areas including, Image Processing, Computer Vision, Software Engineering, Machine Learning, Data Mining, Speech Processing & Recognition and Network & Information Security. Thus far, the department has successfully produced three PhDs, and presently some of its faculty members are on study leave pursuing PhD, both abroad as well as locally. This will further strengthen its research capacity. The department endeavours to attain high standards of research, and is actively contributing in national and international journals and conferences.

15.1 RESEARCH FACILITIES

The Department provides computing and Internet support for all academic and research staff and students. The computer labs are well equipped comprising 170 workstations of various contemporary models and supporting equipment. Several important software tools used in research relating to speech processing, video processing and data mining are available. The Department has access to a large numbers of licensed software from major software companies. The department also facilitates Faculty and research students to utilize library collection which includes general circulation books, reference books, encyclopaedias, handbooks, periodicals, research journals, government and archive documents, microfilms, microfiches, audio / video cassettes, CD-ROM databases and software. Online Journals including IEEE, ACM, Journal of Acoustic Society of America, Elsevier Science Direct, Springer Link can be accessed through digital library facility. The library offers specialized services in the Campus utilizing computerized retrieval of bibliographic databases containing references to thousands of articles, books, proceedings, technical reports and statistics.

15.2 RESEARCH AREAS

The Department has research interest in the following areas:

- **Computer Vision & Image Processing**
  
  Research in this area includes modeling object behavior, human
facial and body action, facial synthesis and super resolution, multi-modal biometrics, 3D deformable shape, and structure from motion. The work has been widely applied to vehicle and people detection and tracking; behavior screening and anomaly detection in public space CCTV.

- **Software Engineering**
  The research is directed towards techniques, methods and processes for development of large complex software intensive systems. Current areas of research include Requirements Engineering, Verification & Validation, Software Process Quality, System Safety, and Software Management. The research results may be applied to a variety of application areas ranging from small-embedded systems to large software applications.

- **Machine Learning**
  Machine learning is the study of adaptive computational systems that improve their performance with experience. Research in this area focuses primarily on natural language learning, statistical relational learning, transfer learning, and active learning, particularly with application in speech and computer vision domains.

- **Data Mining**
  Data mining research focuses on the development of new algorithms, many of which are based on optimization approaches, but also on the development of new tools and applications. The research includes work on semi-structured data and text, as well as stream data. Data mining application in Education and Health domain is under research.

- **Network & Information Security**
  Research in this area includes computer security, cryptography and network security. Some of the key research themes are Anonymity, Authenticity, Availability, Digital Rights Management, Identity Management, Information Hiding, Privacy, Cryptanalysis, Computer Security: defenses against malware, Reliability, Human Aspects of Security, Watermarking, Steganography and Steganalysis. It also includes quantum cryptography (or Quantum Key Distribution), which is a new trend in information security.

- **Speech Processing & Recognition**
  Research in this area is being conducted on developing methods for robust speech recognition, speaker verification and applications of speech processing using machine learning techniques.
15.3 FACULTY MEMBERS

Chairman

Prof. Dr. Najmi Ghani Haider
B.Sc. (Hons) Electronic Engineering (Hull, UK), Ph.D. (Brunel, UK)
99261261-8 Ext. 2399

Co-Chairman

Prof. Dr. Sohail Abdul Sattar
B.E. (Mech., NED); MCS (Computer Science) KU; M.Sc. (Computer Science) NED; Ph.D. (Computer Science) NED
99261261-8 Ext. 2566

Professors

1. Prof. Dr. Najmi Ghani Haider
B.Sc. (Hons) Electronic Engineering (Hull, UK), Ph.D. (Brunel, UK)

2. Prof. Dr. Sohail Abdul Sattar
B.E. (Mech., NED); MCS (Computer Science) KU; M.Sc. (Computer Science) NED; Ph.D. (Computer Science) NED

Associate Professors

1. Dr. Sh. M. Wahabuddin Usmani
B.E. (Electronics, DCET); M.Sc. (Computer Science) NED; Ph.D. (Computer Science) NED; Diploma (Computer Science, SBTE)

2. Dr. Najeed Ahmed Khan
M.Sc. (Computer Science) NED; M.Sc. (Maths) (Gold Medal); Ph.D. (Leeds, UK)

3. Dr. Muhammad Mubashir Khan
M.Sc. (Telecom), Sindh; MCIT (by Research) NED; Ph.D. (Leeds, UK)

4. Mr. Jawaid Ahmad Khan
B.Sc. (Hons); M.Sc. (Applied Maths) KU; M.Sc. (Computer Science) NED
16. DEPARTMENT OF MATHEMATICS

Department of Mathematics was established as an independent department in 2010 to cater to the requirements of Mathematics and Statistics in all the disciplines. The aim of establishing an independent department was to initiate its own degree programs. This Department has launched a Master’s degree program in Applied Mathematics with the objective of imparting strong theoretical knowledge reinforced with skills in utilizing software tools for mathematical applications in different professions. The focus of the said program is related to the particular fields like Engineering, Computational and Financial mathematics. This program commenced from July 2011, and has now successfully running.

16.1 RESEARCH FACILITIES

The Department has a well-equipped computer facility along with related software (like Matlab, Mathematica, SPSS, Minitab).

16.2 RESEARCH AREAS

- Applied Mathematics
- Computational Mathematics

16.3 FACULTY MEMBERS

Chairperson
Prof. Dr. Mirza Mahmood Baig

Professor
Dr. Mirza Mahmood Baig
M.Sc. (Maths) (KU); M.Sc. (Comp. Sc.) NEDUET
Ph. D (Comp. Sc.) NEDUET; Member KMA

Assistant Professor
Dr. Muhammad Jamil
B.Sc. (Hons) (KU);
M.Sc. (Maths) (KU); M.Phil. (KU);
Ph.D. (Maths) (G.C. University, Lahore)
17. **Miscellaneous Research Facilities**

There are a few departments in the University who offer excellent research infrastructure and the highly qualified research faculty, however, owning to the conditions of quality assurance faculty and research infrastructure of these departments are shown below jointly.

17.1 **Department of Petroleum Engineering**

Dr. Abid Murtaza Khan  
Professor and Chair  
B.Sc. (Hons) (University of Baluchistan)  
M.Sc. (University of Baluchistan)  
Ph.D. (Geology), Seoul National University South Korea

The Department has following Laboratories fully equipped to conduct research at PhD level.

i. Mud Engineering and Cementing  
ii. PetroPhysics Laboratory  
iii. PVT Laboratory  
iv. Drilling Simulator Laboratory  
v. Core Laboratory  
vi. Computing Laboratory

17.2 **Department of Automotive Engineering**

1. Prof. Dr.-Ing. Syed Mushahid Hussain Hashmi  
Professor/Chairman  
B.E (Mechanical)  
M.Sc. (Mechanical, Energy Systems)  
Ph.D. (Mechanical)

2. Dr. Faraz Akbar  
Associate Professor  
B.E (Mechanical)  
Ph.D., UK

3. Engr. Dr. Muhammad Aamir Qureshi  
Assistant Professor  
B.E (Electrical Engineering)  
M.Engg. (Communications)  
Ph.D. (Communication & Information Systems)

The Department has following laboratories:

i. Combustion Emission Laboratory  
ii. Body & Suspension Laboratory  
iii. Automotive Electronics Laboratory  
iv. Fuel Cell Laboratory

17.3 **Department of Chemical Engineering**

Prof. Dr. Inayatullah Memon  
B.E (Chemical)  
PhD (Chemical), UK

The Department has following laboratories.

i. Chemical Process Control Laboratory  
ii. Chemical Reaction Engineering Laboratory  
iii. Fluid Mechanics Laboratory  
iv. Heat Transfer Laboratory  
v. Mass Transfer Laboratory  
vi. Particulate Technology Laboratory  
vii. Separation Process Laboratory

It is also worth mentioning that some of the very qualified personnel are part of the University administration but they are also available as PhD Supervisors.
18. REGULATIONS FOR DOCTOR OF PHILOSOPHY DEGREE

1. TITLE AND NATURE OF DEGREE

These Regulations may be called the NED University of Engineering & Technology, Regulations for the proposed Postgraduate studies leading to the Degree of Doctor of Philosophy.

2. COMMENCEMENT

These Regulations shall be applicable for Doctor of Philosophy students admitted in Spring 2014 session and onwards unless otherwise specified.

3. CRITERIA AND PROCEDURE FOR ADMISSION

3.1 Minimum requirement for admission in the Programme shall be Master’s in a relevant discipline or an equivalent degree with a minimum CGPA of 3.0 (out of 4.0 in the Semester System) or First Division (Annual System), recognised by the University, with at most one second division in academic career.

3.2 A subject test conducted by the National Testing Service (NTS) or ETS, USA or an equivalent test conducted by the Department offering admission in the area of specialization chosen at the PhD level must be cleared. In the case of GAT Subject test, a minimum of 60% marks is required to be eligible for admission in PhD Programme. In the case of GRE subject test, 60% Percentile Score is required to be eligible for admission in PhD Programme. In the case of Departmental test, a minimum of 70% score is required to be eligible for admission in PhD Programme.

Note: Only for students admitted in between Spring 2014 session and Spring 2015 session – both inclusive, provisional admission may be granted to an applicant who has not cleared the NTS/ GRE subject test in the area of specialization chosen, who is otherwise eligible for admission. The test result, however, must be submitted by the student to the satisfaction of the eligibility requirements, prior to the end of the second semester of his/ her studies.

3.3 An application for admission to the Programme shall be submitted to the Chairperson of the concerned Department along with all required documents, indicating the proposed major subject area of research work.

3.4 At the time of application, the candidate must provide evidence of adequate financial support to undertake the complete PhD studies.

3.5 NOC from employer will be required at the time of application; if applicable.

3.6 A departmental Postgraduate Admission Committee constituted by the concerned Dean, comprising of the Chairperson and two senior faculty members of the Department/ Faculty, shall assess an applicant’s suitability on the basis of the Entrance Test or NTS (GAT-Subject) or GRE (Subject), academic and professional qualifications, professional experience, reasons for desiring to enrol in the Programme, referees’
opinions letter of recommendations, and submit recommendations to the concerned Dean to allow induction for one year in PhD Programme through concerned Chairperson.

3.7.1 The departmental Postgraduate Admission Committee, with the consent of the candidate and subsequent to the endorsement by the concerned Chairperson, will also recommend one supervisor for each candidate. The supervisor must be an HEC approved Ph.D. Supervisor. In cases where essential, a co-supervisor shall be allowed. Both the supervisor and co-supervisor shall possess a Ph.D. degree and at least one of them should be a faculty member of this University. Formal supervisor allocation should be made at the time of admission of a Ph.D. student.

3.7.2 Each Ph.D. project would have a Ph.D. Review Committee constituting of all Deans and Secretary, ASRB. The role of the Committee would be as follows:

(i) Evaluating the Progress Reports and submitting its report to ASRB in prescribed format.

(ii) Sorting issues with the students, including student grievance issues if any, during the progress of his/her Ph.D. research.

4. GENERAL SCHEME OF STUDIES

4.1 (a) The scholar shall be required to register and qualify in six courses of PhD level – each equivalent to three credit hours. These courses are to be designed by the Supervisor or any other senior faculty member, reviewed by BOS and approved by ASRB.

(b) The scholar is required to successfully pass these courses within a twelve-month period. This period can be extended by a further six months with approval of concerned Dean on the recommendations of Supervisor and Chairperson.

(c) The following grades/grade points with the equivalent marks shall be awarded to the students on the basis of their performance in each course of study.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Point</th>
<th>Marks</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>A</td>
<td>4.0</td>
<td>88 – 100</td>
<td>-</td>
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<tr>
<td>A–</td>
<td>3.7</td>
<td>80 – 87</td>
<td>-</td>
</tr>
<tr>
<td>B+</td>
<td>3.4</td>
<td>75 – 79</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
<td>70 – 74</td>
<td>-</td>
</tr>
<tr>
<td>B–</td>
<td>2.7</td>
<td>67 – 69</td>
<td>-</td>
</tr>
<tr>
<td>C+</td>
<td>2.4</td>
<td>64 – 66</td>
<td>-</td>
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<tr>
<td>C</td>
<td>2.0</td>
<td>60 – 63</td>
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<tr>
<td>C–</td>
<td>1.7</td>
<td>57 – 59</td>
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<tr>
<td>D+</td>
<td>1.4</td>
<td>54 – 56</td>
<td>-</td>
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<tr>
<td>D</td>
<td>1.0</td>
<td>50 – 53</td>
<td>-</td>
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<tr>
<td>F</td>
<td>0.0</td>
<td>Below 50</td>
<td>Fail</td>
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<tr>
<td>S</td>
<td>-</td>
<td>-</td>
<td>Satisfactory</td>
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<tr>
<td>U</td>
<td>-</td>
<td>-</td>
<td>Unsatisfactory</td>
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<tr>
<td>P</td>
<td>-</td>
<td>50 – 100</td>
<td>Pass in non-credit course</td>
</tr>
<tr>
<td>X</td>
<td>-</td>
<td>-</td>
<td>Exempted</td>
</tr>
<tr>
<td>I</td>
<td>-</td>
<td>-</td>
<td>Incomplete</td>
</tr>
</tbody>
</table>

(d) Successful completion of six courses would entail achieving a minimum overall CGPA of 3.0 with all six courses passing.

(e) Registration in a course for change of grade/ improvement will be subject to the following conditions:

i) Change of grade/ improvement may be allowed once for each course.

ii) Better grade(s), if any, will be considered for determining GPA/ CGPA.

4.2 Comprehensive Examination shall be conducted by a committee after successful completion of six courses, consisting of Research Supervisor,
Chairperson and a senior faculty member of the concerned department. This Committee shall be approved by the concerned Dean. The scholar must pass the Comprehensive Examination in a maximum of two attempts to grant him the status of Ph.D. Candidacy. Passing of comprehensive examination would entail obtaining a minimum of 50% score in the exam.

4.3 Comprehensive Examination shall comprise of written examination (and oral if deemed significant by the Committee), covering at least the knowledge imparted in six courses completed during induction period.

4.4 During the induction period the scholar shall have to prepare a research proposal, which the scholar shall be required to present in a Seminar after obtaining Ph.D. Candidacy. If the Supervisor/Department deems that the proposal needs further work, it may apprise the scholar appropriately assigning him a timeline for a proposal re-defense. Re-defense would only be allowed once. Successful completion of the Research Seminar shall be communicated by the concerned Chairperson to ASRB on prescribed Performa.

4.5 After having successfully defended research proposal, the proposal shall be recommended by the Supervisor for approval from ASRB through concerned Board of Studies and Dean, on the prescribed format approved by ASRB. The concerned Board of Studies may adopt its own procedure for evaluating the technical and financial merit of the proposal and will submit, along with the proposal, its recommendations on prescribed format duly endorsed by the Chairperson and the Dean for consideration of ASRB.

4.6 The registration in Ph.D. research shall only be confirmed by ASRB subject to following conditions:
(a) The Scholar has successfully completed six courses with 3.0 CGPA.
(b) Has qualified Comprehensive Examination.
(c) Successfully presented Research Proposal in a Seminar.
(d) Research proposal has been approved by ASRB.

4.7 Research performance will be based on fulltime research conducted after confirmation of registration in Ph.D. research by ASRB.

4.8 The minimum period of full-time research shall be two, and a maximum of eight years shall be allowed for completion of all requirements for the Ph.D. degree. After a period of three years from the date of admission in Ph.D. programme, further extensions in the period of research may be granted by the concerned Dean on recommendation of Supervisor and concerned Chairperson, with Dean reporting to ASRB in due time.

Note: For students admitted in between Spring 2014 session and Spring 2016 session – both inclusive, maximum of seven years shall be allowed for completion of all requirements for the Ph.D. degree.

4.9 Each candidate shall get accepted at least one paper, containing his research work during Ph.D. carried out at this University, in a journal as prescribed by relevant University regulations at the time of candidate’s enrolment in Ph.D. degree, prior to submission of his thesis for examination to foreign reviewers.

5. RESEARCH ASSIGNMENT AND SUPERVISION

5.1 The Supervisor shall be responsible for initial definition and plan of the research assigned to the scholar.

5.2 The Supervisor shall also be responsible for guiding the candidate in development of the research
5.3 The Supervisor shall suggest reading material to enhance the scholar’s understanding of subjects related to the research topic.

5.4 The Ph.D. Review Committee shall regularly monitor on biannual basis for externally funded Ph.D. projects and quarterly basis for University funded Ph.D. projects (fully or partially funded) the progress of the candidate and then submit a report to ASRB on prescribed format. The Committee shall meet once every quarter – prior to scheduled ASRB meetings – for providing its recommendations to ASRB on the accumulated Progress Reports.

5.5 The research work shall be carried out in the concerned Department or in the laboratory of some other Department(s) of the University. With the approval of the concerned Dean some part of such work may be carried out in some other organization or institution.

6. PROGRESS OF WORK

6.1 Each candidate shall be expected to attend the University regularly and submit to the supervisor Quarterly (for projects partially or fully funded by University) or Biannual (for externally funded projects) Progress Reports during the period of research. This report shall be submitted to Ph.D. review committee for evaluation and subsequent recommendations to ASRB. Any candidate failing to attend the University regularly and/or not showing sufficient progress may not be allowed to continue enrolment in the programme.

6.2 Any change in the subject, title and/or outline of the approved research proposal shall require prior approval of ASRB. Such change shall be submitted to ASRB through the concerned Board of Studies.

6.3 (a) A candidate, who is temporarily unable to continue research because of unavoidable circumstances, should file an application to the ASRB through the Supervisor for temporary suspension from the programme. Such leave of absence shall not exceed twelve months. During this period, the Ph.D. project shall be suspended and no remuneration shall be paid.

6.3 (b) On return after availing the leave, Chairperson of the concerned department on recommendation of Supervisor may allow the student to continue and inform ASRB.

6.4 Admission of any candidate enrolled in the programme may be cancelled under the following circumstances:

i. If the candidate is not regular in attending the University.
ii. If the candidate is involved in any serious disciplinary action.
iii. If the candidate fails to qualify six courses or pass comprehensive examination after two attempts.
iv. If the candidate fails to successfully defend the research proposal after two attempts.
v. If the candidate fails to demonstrate satisfactory progress.

7. SUBMISSION AND EVALUATION OF THESIS

7.1 A candidate may be allowed by the Vice Chancellor to submit the thesis only after:

7.1.1 Fulfilling all requirements put forward by the Postgraduate Admission Committee at the time of admission;

7.1.2 Successful registration in Ph.D. research as per clause 4.6;

7.1.3 Pursuing full-time research work for at least twenty-four months at the University;

7.1.4 Publishing/ Getting accepted one journal paper as per clause 4.9.

7.1.5 Fulfilling all other regulatory
requirements prescribed by the University.

7.2 Every candidate shall be required to produce a declaration counter-signed by the Supervisor and endorsed by the Chairperson that his thesis contains material contribution to knowledge and affords evidence of originality shown by the discovery of new facts or of new interpretations and that the thesis represents original work done by the candidate himself.

7.3 The thesis shall be written in the English language and shall be in the form prescribed by the University.

7.4 No thesis shall be considered satisfactory unless it shows evidence of original inquiry, capacity for development or application of scientific principles and methods, acquaintance with work of others in similar fields and ability in presentation of ideas.

7.5 The concerned Board of Studies shall evaluate the thesis and recommend it for onward submission to two foreign experts. The concerned Board of Studies may devise its own procedure for evaluating the thesis.

7.6 The thesis shall be submitted to two Ph.D. experts as referees. These referees are to be approved by ASRB on recommendation of the Board of Studies concerned. The selection of the foreign reviewers shall be as follows:

7.6.1A tenured, tenure-track or non-tenure-track faculty member with or without dissertation status working in a recognized university or a recognized research organization may be eligible provided that s/he fulfils the following minimum eligibility:

(a) S(He) should have been working for a minimum of last 5 years on a rank of Assistant Professor or above in a recognized university or equivalent position in a recognized research organization/research departments in organizations in a technologically/academically advanced country as per HEC prescribed list.

(b) S(He) should not have served as Supervisor/Co-Supervisor of the Ph.D. candidate during the candidate’s earlier higher education studies.

(c) S(He) should not have been a co-author of the candidate on any publication.

(d) S(He) should have relevant academic expertise as demonstrated by at least two of the following:

i. S(He) holds a doctoral degree in the subject area of Ph.D. project.

ii. S(He) has at least 10 research publications in the subject area of Ph.D. project in peer-reviewed journals of international repute indexed by ISI or Scopus, in the last 5 years.

iii. S(He) has at least 5 research publications in the subject area of Ph.D. project in peer-reviewed journals of international repute indexed by ISI or Scopus, and at least 2 patents approved by International Patenting Association/Office from a technologically/academically advanced country, both in the last 5 years.

iv. S(He) has at least 5 research publications in the subject area of Ph.D. project in peer-reviewed journals of international repute indexed by ISI or Scopus, and at least 1 peer-reviewed book authored/edited that has been published by an
international publisher of repute from a technologically/ academically advanced country, both in the last 5 years.

v. S(He) has produced at least 2 Ph.Ds./ Post-Docs in the subject area of Ph.D. project in the last 5 years, in a technologically/ academically advanced country.

vi. S(He) has served on doctoral committees of at least 4 Ph.Ds./ Post-Docs in the subject area of Ph.D. project in the last 5 years, in technologically/ academically advanced countries.

vii. S(He) has won at least 2 research grant awards as PI/ Co-PI in the subject area of Ph.D. project in the last five years with funding amount greater than US$100,000 (or equivalent) for each, in technologically/ academically advanced countries.

7.6.2 All tenured or tenure-track faculty members fulfilling criteria mentioned in sub-clause 1 above are eligible for consideration of the Board without any further evaluation.

7.6.3 All non-tenure-track faculty members with dissertation status (i.e. approved by their universities to serve on doctoral committees), fulfilling criteria mentioned in sub-clause 7.6.1 above are eligible for consideration of the Board without any further evaluation.

7.6.4 All non-tenure-track faculty members without a dissertation status in their universities may be considered by the Board if s(he) meets at least two of the following requirements in addition to those in sub-clause 7.6.1 above:

a) S(He) should have been consistently teaching graduate courses (5-level or above) for the last 5 years (at least 3 courses per academic year on average) in a university belonging to a technologically/ academically advanced country.

b) S(He) should have at least 10 research publications in the last 5 years. Research publications for the purpose of eligibility may include papers in peer-reviewed journals of international repute, which are indexed by ISI or Scopus; peer-reviewed books authored/ edited that have been published by an international publisher of repute from a technologically/ academically advanced country; and patents approved by International Patenting Association/ Office from a technologically/ academically advanced country.

c) S(He) should have produced at least 2 Ph.Ds./ Post-Docs in the last 5 years in technologically/ academically advanced country.

d) S(He) should have served on doctoral committees of at least 3 Ph.Ds./ Post-Docs in the last 5 years in technologically/ academically advanced country, in addition to his or her own Ph.D./ Post-Doc students.

e) S(He) should have won at least 2 research grant awards as PI/ Co-PI in the last 10 years with funding amount greater than US$100,000 (or equivalent) for each, in a technologically/ academically advanced country.

f) S(He) should have been actively serving in international technical committees, or editorial boards of international journals of repute, or task forces and think tanks related to the area of expertise, or
committees for development/improvement of policy and legislation.

7.7 The Plagiarism Test must be conducted on the thesis by the Supervisor using Turnitin Software, or any other software approved by the University, before its submission to the two foreign experts. The candidate will be required to bring the similarity in acceptable range as prescribed below:

(i) Overall acceptable range of similarity index either from candidate’s own previous work or the work of some other person(s) is less than 20%.

(ii) Maximum acceptable range of similarity index from an individual link is 5%.

(iii) There must not be a similarity more than 3% in the abstract of the thesis.

(iv) Verbatim copy of text would be considered as plagiarism.

(v) While conducting similarity test, following settings, as recommended by HEC, should be followed:
   • Exclude bibliographic material = Yes;
   • Exclude small matches = Yes;
   • Exclude matches by: Word count = 5 words
   • All other settings left at default

7.8 On the recommendation of the Board of Studies concerned, the Advanced Studies and Research Board shall propose a panel of three examiners including the Supervisor for evaluation of thesis and examination. One examiner shall be from outside the University.

7.9 A candidate shall submit an application on prescribed form after fulfilling conditions of Section 7.1 to the Vice Chancellor for his examination and shall submit three copies of the thesis for evaluation.

7.10 An open defense of the thesis (an announced public seminar followed by an examination by the designated examiners) shall be conducted after positive evaluation from foreign experts.

7.11 Three examiners shall examine the thesis. The report of the experts shall also be made available to the examiners. The candidate shall be required to undergo a viva-voce examination to be conducted jointly by the examiners. The panel of examiners shall submit a report to the ASRB. No degree shall be awarded unless all the three examiners recommend the award of degree.

7.12 The result of examination shall be declared in the following manner:

(a) Requirement fulfilled without any corrections
(b) Requirement fulfilled with minor corrections
(c) Deferred
(d) Failure

7.12.1 In case of result as 7.12(b); one of the members of the Examiners’ Committee, as nominated by the Examiners' Committee, shall certify that the corrections are carried out to his satisfaction.

7.12.2 In the case of a deferred result the Examiners’ Committee shall indicate in what respect the material of the thesis should be modified and specify period for re-submission. Committee shall also decide whether to hold subsequent examination or not.

7.12.3 The Examiners’ Committee shall deposit the result of the entire examination of the candidate immediately after the oral examination and shall submit the result in the prescribed form to the Controller of Examinations.
7.13 If the thesis is not accepted for Ph.D. degree but found to have made some contribution sufficient for award of Master’s Degree, the University may on the recommendation of examiners, confer Master’s Degree by Research to the candidate, subject to re-submission after necessary changes in the thesis format.

7.14 If the examiners find that the thesis is wholly inadequate they may recommend that it be rejected without any further test.

8. AWARD OF DEGREE
If the candidate passes the examination, his result may be declared with the permission of the Syndicate and he may be awarded the degree.

9. PUBLICATION OF THESIS
9.1 A candidate, having qualified himself for the degree of Doctor of Philosophy, shall submit four hard copies of the thesis and one soft copy of the thesis on a CD/ DVD in a prescribed format to the Chairperson of the concerned Department.

9.2 The Chairperson shall retain one copy for the departmental Library and shall forward three copies to Controller of Examinations for necessary disposal as follows:
   9.2.1 Two copies to be disposed to University Library.
   9.2.2 One hard copy and one soft copy (on CD/ DVD) to be disposed to the Registrar for onward transmission to HEC for record in Ph.D. Country Directory and for attestation of the Ph.D. degree by the HEC in future.

9.3 The NED University of Engineering & Technology shall have the intellectual rights of the outcome of any research carried out within University.

10. REMUNERATION OF EXAMINERS, FEES AND OTHER CHARGES
10.1 Examiners shall be paid such remuneration as may be prescribed by the University from time to time.

10.2 The rate of fees and other charges payable by the students shall be such as may be prescribed by the University from time to time, and announced through the relevant Prospectus/ University Notifications.

10.3 Subject to approval by the competent authority, these Regulations may be changed from time to time. Changes shall be announced through University Notifications and/or relevant Prospectus.

11. CONDUCT OF PH.D. PROGRAM
11.1 There should be at least 3 relevant full time Ph.D. Faculty members in the faculty to launch the Ph.D. program.

11.2 The maximum number of Ph.D. students under the supervision of a full time faculty member is five which may be increased to eight under special circumstances in certain teaching departments subject to prior approval of the Vice Chancellor.
Flow Chart for Ph.D. Programme

M.Phil/M.S/Equivalent GPA => 3.0

ETS GRE Subject Test (in 8 available subjects)  
NTS GAT Subject Test  
University Based Test

Qualifying Score

Minimum 18 Credit hours course work with CGPA=3.0

Comprehensive Exam (Maximum Two attempts)

Success

NO  
Dropout from PhD

YES  
PhD Candidacy

PhD Research Proposal

Minimum one paper accepted in University approved Journal

Dissertation Approved (By Ph.D. Advisory Committee)

Dissertation Approved (By two foreign relevant subject experts)

Open Defense of Dissertation

Award of PhD Degree

Submission of Dissertation copies to University and HEC for PhD Country Directory
11. UNIVERSITY FEES AND DEPOSIT

The following are the University fees:

1. Fee payable at the time of admission to the Programme
   
   (i) Application Processing Fee Rs.5,000  
   (ii) Admission/Re-admission Fee Rs.5,000  
   (iii) Enrolment fee, if applicable Rs.3,000  
   (iv) Security Deposit Rs. 5,000  
   (v) Documents Verification Fee Rs.2,000

2. Fee Payable in each semester
   
   (i) Tuition Fee Rs. 50,000  
   (ii) Library Fee Rs.2,000  
   (iii) Internet Fee Rs.1,000  
   (iv) Late Fee, if applicable Rs.5,000