School of Engineering

- **Area of Specialization in Computer Science**
  - Feature Combiners with Gate-Generated weights for classification, Data-core based Fuzzy Min-Max Neural Network for Pattern Classification, Text Classification in soft computing domain, Design of a Semi-Supervised Neuro-fuzzy systems, Classifier Ensembles
  - multi-criterion optimization techniques, computing architecture design and optimization, design automation (EDA), architectural synthesis/logic synthesis.
  - Advanced linear solvers, Krylov subspace methods with recycling, preconditioning methods, model reduction, uncertainty quantification, quantum Monte Carlo methods, homology methods, digital libraries
  - Web service composition, Service-Oriented Systems, Dynamic Systems, Agile Techniques

- **Area of Specialization in Electrical Engineering**
  - Developing efficient algorithms for personal recognition using biometrics, especially face and hand based biometric traits that are acquired in realistic conditions, Exploring integration of multibiometrics in multi-camera surveillance system, Novel and efficient feature descriptors for generic image matching, Content based image retrieval
  - Multi-hop communication using relays, Advanced Wireless communication using MIMO/OFDM
  - Bio-sensors and Bio-instrumentation: This includes development of new optical bio-sensing technique that can be applied to biomedical diagnostics, Photothermal Imaging and Sensing: Photothermal imaging and sensing are two microscopy techniques which have been used for the diagnosis of apoptosis. Extensive study of these techniques, Bio-imaging: Venturing into new bio-imaging techniques that can be used to solve specific fundamental problems in biology, Biophysics: Development of new quantitative techniques to approach biological problems from a biophysical point of view
  - Power electronics with application to renewable energy
  - Wireless cooperative communications, MIMO systems, Relay technologies, Cognitive radio, Smart grid
  - Synchrophasor applications to power system, Power system analysis with renewable energy sources
  - Investigation on nanoscale phase change random access memory devices, Device fabrication and characterization of Ovonic Threshold Switching (OTS) and Ovonic Memory Switching (OMS) devices, time-resolved electrical switching kinetics, transient effects, SET and RESET operation and device performance characteristics, Development of high density phase change memory devices, Multi-bit data storage technology, vertically stackable cross-point phase change memory devices, resistance drift measurements, structural stability and programming characteristics, Understanding local structure and physical properties of thin film phase change memory materials, Exploring new phase change memory materials, scaling properties, crystallization kinetics of fast/slow crystallizing materials and structural properties.
  - Design and Fabrication of Nanodevices, Design semiconductor lasers, CNT-based devices, Nano-scale Photodetectors, Solar Cell design and fabrication, Nano sensors based on ZnO, GaN
  - Biomedical Signal Processing, Speech Processing, Nonstationary Signal Analysis
  - Ultra Low power device and circuit design in SOI technology for analog/RF/digital applications
  - Organic electronic/ photonic devices and their applications, Photoluminescence Spectroscopy, thin film fabrication/characterization, charge carrier transport/generation in organic materials. Organic Field Effect Transistors (OFETs), Organic Solar Cells (OSCs), Organic Light Emitting Diodes (OLEDs) and Organic Memory Devices etc., Silicon Nano devices/ Single electron devices, Bulk/SOI MOSFETs, Low frequency noises in MOSFETs, MOSFET based sensors. Low power information processing circuits and RF-SET
**Area of Specialization in Mechanical Engineering**

- **Production & Industrial Engineering**: Laser surface coatings, Gear research, Mechatronics, Laser Micro Machining, Advance & Hybrid machining & finishing process.
- **Design**: Robotics, Condition monitoring, Noise and vibration, Signal processing of mechanical systems
- **Industrial Engineering**: Reliability/Maintenance Engineering.

**School of Basic Sciences**

**Area of Specialization in Mathematics**

- Numerical Linear Algebra and Stability analysis for Stochastic Differential Equations
- Numerical Functional Analysis and Fractional Differential Equations
- Algebra
- Wavelets and Harmonic Analysis
- Rough Set Theory and Modal Logics

**School of Humanities and Social Sciences**

**Area of Specialization in Psychology**

- Human Factors, HCI, Applied Cognition

**Area of Specialization in Philosophy**

- Moral Philosophy, History of Ideas, Political Philosophy, Social and Political Philosophy

**Area of Specialization in English**

- Postcolonial studies with interest in inter-disciplinary research in areas of globalization, cosmopolitanism, cultural studies and gender. Additional interest in the issue of language and translation theory will be useful. Students interested in interrogating the theoretical parameters of postcolonial studies using comparative studies of different literatures are encouraged to apply. Knowledge and fluency in at least one language (regional languages) other than English will be important. Knowledge about the literary culture and works in that language will be an added asset.

**Area of Specialization in Sociology**

- Water resource politics and management in South Asia;
- Socio-political/Cultural/ comparative study of natural resource management; Local and global dynamics of water governance with a focus on technology, knowledge and institutional aspects;
- GIS and spatial tools in local/national/international water governance;
- Critical realist approaches and qualitative research in water management.
- International development studies and natural resource management.