

قسم الهندسة الكهربائية

(a) Computer Engineering & Systems Branch

The research areas of Computer Engineering & Systems branch are:

Artificial Intelligence

- Deep Learning
- Neural Networks
- Fuzzy Logic applications
- Expert Systems
- Agents and Multi-agent Systems
- Natural Language Processing
- Data Mining
- Robotics

Security

- Biometrics
- Internet Security
- Intrusion Detection
- Web Services and Performance
- Secure Transactions
- Cryptography

Ambient Intelligence

- Networking
- Signal Processing
- Network Evolutions
- Communication Protocols
- Sensing and Sensor Networks
- Smart Healthcare
- Intelligent Transportation
- Agents and Multi-agent Systems

- 1) Image Captioning Based on Vision Transformer Models
- 2) Prediction in Fractional Delayed Energy-Based Models
- 3) Application of Generative Adversarial Networks and Deep Neural Networks
- 4) Reduction of information systems
- 5) Deep learning detection based on concatenated and recurrent modalities

- 6) Application of Internet of Things
- 7) Artificial intelligence applications
- 8) Application on control systems

(b) Electrical Power and Machines Branch

The research areas of power systems and electrical machines branch are:

New and Renewable Energy:

- New and Renewable Energy Systems.
- Green Buildings.
- Energy Storage.
- Integration of New and Renewable Energy Resources in Power System.

Smart Grid:

- Smart Power Grid.
- Smart House.
- Multi-objective Optimization and Control of Smart Grid.
- Intelligent Control Application in Smart Grid.
- Distributed Generation and Microgrid in the Environment of Smart Grid.
- Wide Area Monitoring using Phasor Measurement Units (PMUs), Dynamic State Estimation, and Distributed Control of Power System.
- Internet of things (IoT) applications in Smart Power Grid.
- Applying Blockchain Technology to Power Systems.
- Application of Big Data in Electric Power Systems.

Electrical Machines:

- Optimal Operation and Performance of Electrical Machines.
- Optimal Design of Electrical Machines Using New Technique.
- Maximum Power Tracking of Renewable Energy.
- Control of Electrical Machine Using DSP and Microcontrollers.
- Modern drive system application.

Power Electronics:

- Power Electronics Applications in Electrical Machines.
- Power Electronics Applications in power systems.
- Power Electronics Applications in the New and Renewable Energy Systems.
- FACTS and HVDC Transmission Systems.
- Plug-in Electric Vehicles (PEVs).

High Voltage and Distribution Systems:

1. Overcoming the disturbances in DG with and without renewable energy sources
2. Predictive and preventive maintenance effects in electrical equipment operation and lifetime.

3. Increasing the quality (efficiency- voltage drop...etc.) of HV/EHV T.L and cables
4. Improvement of HV/EHV stations Protection under normal and abnormal conditions
5. Study the medium/HV/EHV insulation operation under normal and abnormal conditions
6. Increasing the insulation resistance (behavior) by different insulation materials combinations
7. Renewable energy sources and economical applications.

Protection of networks, Applications and Evolving technologies

1. Micro-grids and islanded networks, effect of functional integration in IEDs on reliability, availability and maintainability
2. Embedded and point-to-point DC interconnectors and networks
3. Distribution and LV networks, system integrity and wide area protection
4. Industrial networks, digital substations: protection aspects
5. Transmission networks, new protection algorithms and software solutions
6. Railway networks, condition monitoring and situational awareness – with focus on protection
7. Performance aspects and weak networks, conventional and non-conventional instrument transformers
8. Grid codes and policy / legislative issues that may impact on protection
9. Protection of conventional generation systems and grid interconnections
10. Protection of renewable generation and grid interconnections
11. Protection against network instability and low inertia
12. Transformer protection, design and application of substation communications and integrated systems
13. High impedance fault detection of over head and underground cable testing procedures and tools
14. Protection of energy storage and novel loads.

Power System Planning and Operation

1. Energy Pricing and Power Market Deregulation
2. Power Quality Study with Existing of Renewable Energy Resources and Nonlinear Loads
3. Power System Optimization
4. Artificial Intelligence Applications in Power Systems

(c) Electronics and Communications Branch

The research areas of Electronics and Communications are:

Optoelectronics:

- Nano optics and Nano electronics.
- Optical amplifiers.
- LASER applications in industry and medicine.
- Light sources and detectors

Photonics and Nanotechnology:

- Nanotechnology applications.
- Quantum dots: fabrications, characteristics and applications.
- Optical Nano antennas.
- Integrated Optics and optical fibers.

Optical communications:

- Optical communications networks.
- Optical computers and Optical measurements.

Antennas and microwaves:

- Computational Electromagnetic and microwaves.
- Plasma antennas.
- Leaky Wave Antennas.
- Reflect arrays and transmitter array.
- optical antennas.
- 5 G antennas

Digital communications:

- Digital communications networks.
- Mobile communication network.
- Cognitive radio network.
- WIMAX and WIFI network.
- Modulation techniques for 5G and beyond

Security:

- Secure communication channels.
- Cryptography and cryptanalysis.
- Secure electronic fund transfer.
- Security in mobile communication.
- Cyber security
- Information security.

قسم الهندسة الميكانيكية

أولاً :- شعبة هندسة القوى الميكانيكية

- Modified HDH desalination systems
- Improved solar still systems for water desalination
- Multi-stage flash distillation
- Fuel cells technology
- Hydrogen generation
- PV cooling techniques

- Solar powered and solar assisted refrigeration and air conditioning.
- Solar air heating for drying applications.
- Heat Transfer Enhancement using Nano-Fluids.
- Energy Storage Technologies.
- Solar / Wind hybrid Systems.
- Multiphase flow.
- Turbo machinery.
- Alternate Fuels and Internal Combustion Engine.

ثانيا : - شعبة هندسة الإنتاج والتصميم الميكانيكي

- Friction Stir Additive Manufacturing of Aluminum.
- A Comparative Study on Laser Cutting vs. Electrical Discharge Machining of Stainless Steel Alloy.
- Development of A Polymer-Aluminum Composite Structure Fabricated by Friction Stir Additive Manufacturing (FSAM) Technique.
- Laser welding on Aluminum alloys in Fixed equipment; storage tanks and pressure vessels.
- Kinematic and dynamic analysis of parallel manipulators.
- Control of parallel robots.
- Kinematic and dynamic analysis of mobile robots.
- Control of mobile robots.
- Advanced material Characterization.
- Design and modeling of fuel cells.
- Design of mechatronic systems.
- Biomedical materials.
- Sheet metal forming.
- Nonconventional machining.
- Energy harvesting from human movement to power medical devices

قسم الهندسة المعمارية

1. الطاقة

تحسين كفاءة الطاقة التقليدية- طاقة الرياح- الطاقة الشمسية- الطاقة الحيوية- الطاقة النووية

2. الموارد المائية والبيئية

تلوث الماء والهواء و معالجتهم و تدوير المخلفات الصلبة تكنولوجيا تحلية مياه البحر - تنمية وإدارة الموارد المائية
حماية المسطحات المائية

3. الدراسات الانسانية و القيم المجتمعية

الدراسات المجتمعية و العموانية، الدراسات الثقافية و التراثية، الفنون و الفلسفات المعمارية

4. تكنولوجيا المعلومات و العلوم المستقبلية

نظم الحاسبات أمن المعلومات أمن الشبكات المدعمة الإلكترونيات النانوية الذكاء الاصطناعي لنانو تكنولوجيا
أبحاث المواد الجديدة طرق التصنيع الجديدة

5. الاستثمار و التجارة والصناعة و النقل

السكك الحديدية الطرق النقل النهري النقل البحرى و التطور الصناعي

قسم الهندسة المدنية

(a) Structural Engineering

- Behavior of beams made of nano-modified concrete mix
- Improving the structural performance of reinforced concrete elements using carbon nanotubes
- Seismic behavior of structures
- Analysis of RC beams strengthened using ultra high-performance fiber reinforced concrete plates
- Effectiveness of Using FRP Bars as Reinforcements for High-Strength Concrete Structures.
- Strengthening of RC structures using FRP composites.
- Shear strengthening of RC beams constructed from recycled concrete aggregate using FRP
- Behavior of recycled concrete structural elements.
- Fracture properties of fiber reinforced concrete
- Fracture behavior of recycled concrete.
- Load carrying capacity of multi-cell composite column
- Fuzzy systems in civil engineering
- Shear performance of structural elements strengthened using ultra high-performance fiber reinforced concrete plates
- Effect of carbon nanotubes on strengthening of RC structures retrofitted with carbon fiber/epoxy composites
- Ranking fuzzy numbers

- Improvement of concrete Mechanical properties & reinforcement steel
- steel fiber reinforced concrete
- Stability of steel/concrete structures
- Behavior of composite beams with opening
- Shear performance of I-steel sections encased UHPFRC.
- Improving the mechanical characteristics of green concrete
- Improving the mechanical behavior of concrete mixtures using steel, polypropylene and recycled plastic fibers.
- Behavior of self-compacted concrete
- **(b) Public Works Engineering**
- Effect of Speed Humps/Bumps on The Flow Speed & The Pavement Condition of The Road
- Priorities For Road Maintenance
- Use of Geogrid in Reinforcement Asphalt Mixtures Prepare by The Recycled Asphalt Materials
- Development of a Dynamic Traffic Assignment Model for Main Roads Network in Kafr-El-Sheikh City
- Impact of Pavement Rutting on Traffic Operational Performance
- Improving the performance and properties of the problematic soil by using polymers
- Performance of the Hot Mix Asphalt Containing Local Industrial Wastes
- Detection of Deformation in Reinforced Concrete Beams Using Close Range Photogrammetry Techniques
- Evaluation of Digital Elevation Models Resulting from Geographic Information System (GIS) Using Terrestrial Observations
- Public Transportation Systems City: Evaluation and Possible Improvements
- The Impact of several Errors sources on Efficiency of Digital Survey Instruments
- Infrastructure Assets Management and Evaluation of Transportation and Traffic Projects
- Transport Planning, Traffic Engineering and Traffic Safety
- Studying Elements of Road and Factors That Affecting Both the Traffic, Transport, And Environment
- Traffic analysis and geographic information systems (GIS)
- Modification of hot asphalt mix
- Stabilization of subgrade

- Network design optimization in close range photogrammetry.
- Close Range Photogrammetry
- Terrestrial Laser Scanner
- Water and Wastewater Treatment
- High Strength Wastewater Treatment
- Aerobic and Anaerobic Treatment
- Maximize The Economic Benefit of Water and Wastewater Treatment
- Management of Water and Wastewater Treatment
- Sanitary works in buildings
- Plumbing
- Industrial wastewater treatment
- Water Treatment for Aquaculture
- Effect of Aquaculture on Aquatic Environment
- Use of Agricultural Waste in Water and Wastewater Treatment
- Management and Treatment of Solid Waste
- Rice Straw in Water Treatment
- Water recycling
- Use black sand in water treatment
- Salinity water treatment
- **(c) Irrigation and Drainage Engineering**
- Sea water intrusion
- Coastal engineering & Shore Protection
- Sea water intrusion
- Ground water hydrology
- Irrigation system analysis
- Stability of dams & embankment
- Water resources
- Hydraulic structures
- Open channel flow
- Scour & Sedimentation at open channel
- Pipe networks
- Reuse of agriculture drainage water
- Seepage
- Contaminant transport through the soil
- Assessment of Different Methods for Estimation of Missing Rainfall Data

• تحسين كفاءة استخدام المياه

• ترشيد استخدامات الموارد المائية

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- الحفاظ على نوعية المياه ومجابهة التلوث
 - ترميم المنشآت المائية باستخدام مواد محلية
 - استخدام التكنولوجيا الحديثة في ادارة المياه مثل انظمة التليمتري والاستشعار عن بعد
 - زيادة القيمة الاقتصادية لإنتاجية المياه
 - تقليل البخر في المجاري المائية