MINERALS AND MATERIALS BENEFICIATION

DEPARTMENT OF CHEMICAL ENGINEERING

- Materials beneficiation
- Minerals beneficiation
- Advanced materials and polymers
- Modelling, optimisation and control

DEPARTMENT OF CIVIL ENGINEERING

- Geotechnical analysis for construction

DEPARTMENT OF MATERIALS SCIENCE AND METALLURGICAL ENGINEERING

- Efficient processing into higher level products
- Advanced processes
- Smart materials

DEPARTMENT OF MINING ENGINEERING

- Laser cutting and microwave rock breaking technology
- Minimising noxious gases and dust creation

DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT

- Systems engineering
- Assets and maintenance risk management

ENERGY

DEPARTMENT OF CHEMICAL ENGINEERING

- Advanced materials
- Biochemical engineering, biotechnology and bioprocessing
- Modelling, optimisation and control

DEPARTMENT OF CIVIL ENGINEERING

- Small-scale hydropower systems

DEPARTMENT OF ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

- Supply and demand-side energy optimisation and management
- Automation and control

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

- Reliability engineering

DEPARTMENT OF MATERIALS SCIENCE AND METALLURGICAL ENGINEERING

- Smart materials and processing

DEPARTMENT OF MECHANICAL AND AERONAUTICAL ENGINEERING

- Clean energy
- Reducing water consumption for electrical power generation
- Performance management of power generation
- Life cycles of assets in power generation plants
- Artificial intelligence for condition monitoring

DEPARTMENT OF ARCHITECTURE

- Resource efficiency in building

DEPARTMENT OF INFORMATION SCIENCE

- ICT in energy management

DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT

- Systems engineering
- Assets and maintenance risk management

BIG DATA SCIENCE, ICT AND TECHNOLOGY INNOVATION MANAGEMENT

DEPARTMENT OF CIVIL ENGINEERING

- Datasets analysis for active infrastructure

DEPARTMENT IF ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

- Sensor and data fusion
- Virtual reality visualisation of big data
- Telecommunication technologies and infrastructure

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

- Supply chain modelling and optimisation
- Intelligent logistics
- Enterprise engineering
- Data analytics

DEPARTMENT OF MECHANICAL AND AERONAUTICAL ENGINEERING

- Performance management of power generation and distribution
- Artificial intelligence for condition monitoring
- Machine health management
- Autonomous and connected vehicles

DEPARTMENT OF MINING ENGINEERING

- Change management for mining
- Change management for gold and platinum
- Virtual reality for mining

DEPARTMENT OF ARCHITECTURE

- Visual and micro-scale datasets for architecture

DEPARTMENT OF CONSTRUCTION ECONOMICS

- Big databases for building cost and indices
- Lifecycle costing in construction

DEPARTMENT OF COMPUTER SCIENCE

- Machine learning
- Artificial intelligence
- Cyber-security
- Digital forensics
- Formal methods
- Software engineering

DEPARTMENT OF INFORMATICS

- Data science
- Information systems
- ICT for development

DEPARTMENT OF INFORMATION SCIENCE

- Virtual reality for user experience (UX) development

DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT

- Knowledge systems
- Learning processes
- Optimising innovation
- Project management
- Systems engineering
- Risk management

The University of Pretoria's Faculty of Engineering, Built Environment and Information Technology (EBIT) is the only faculty at a South African higher education institution to house the unique combination of these disciplines in a single faculty. It is therefore in the ideal position to pursue an integrated research strategy to address the challenges of the Fourth Industrial Revolution (4IR).

RESEARCH CONTRIBUTIONS: 4IR

www.up.ac.za/ebit – Postgraduate Studies

WATER AND ENVIRONMENTAL ENGINEERING

DEPARTMENT OF CHEMICAL ENGINEERING

- Water utilisation
- Environmental engineering
- Biochemical engineering
- Bioprocessing
- Modelling, optimisation control

DEPARTMENT OF CIVIL ENGINEERING

- Water reticulation networks
- Small-scale hydropower systems
- Urban runoff

DEPARTMENT IF ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

- Integrated microelectronic sensor systems for biomedical and environmental applications

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

- Reliability engineering

DEPARTMENT OF MATERIALS SCIENCE AND METALLURGICAL ENGINEERING

- Efficient processing into higher value products
- Smart materials and processes

DEPARTMENT OF MECHANICAL AND AERONAUTICAL ENGINEERING

- Clean energy
- Reducing emissions to the environment
- Reducing water consumption for electrical power generation
- Mechanical infrastructure for the water industry
- Artificial intelligence for monitoring water infrastructure
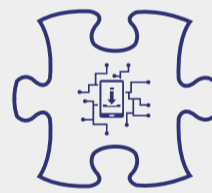
DEPARTMENT OF ARCHITECTURE

- Resource efficiency design

DEPARTMENT OF TOWN AND REGIONAL PLANNING

- Environment behaviour studies

DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT

- Technology Innovation management
- Project governance

SMART CITIES AND TRANSPORTATION

DEPARTMENT OF CIVIL ENGINEERING

- Service delivery
- Transportation infrastructure
- Road and rail research
- Geotechnical analysis

DEPARTMENT IF ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

- Sensors
- Smart grids
- Renewable energy systems
- Energy management in buildings
- Internet of Things
- Intelligent transportation

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

- Transportation development and modelling
- Waste collection optimisation

DEPARTMENT OF MATERIALS SCIENCE AND METALLURGICAL ENGINEERING

- Smart materials and processes

DEPARTMENT OF MECHANICAL AND AERONAUTICAL ENGINEERING

- Vehicle dynamics
- Autonomous and connected vehicles

DEPARTMENT OF ARCHITECTURE

- Resource efficiency
- Resilient and regenerative environments
- Socioecological wellbeing
- Climate change adaptation
- Biodiversity restoration
- Spacial justice
- Urban citizenship
- Heritage and cultural landscapes

DEPARTMENT OF CONSTRUCTION ECONOMICS

- Shopping centre management
- Green buildings cost
- Alternative building materials

DEPARTMENT OF TOWN AND REGIONAL PLANNING

- Safe and sustainable housing and urban spaces

DEPARTMENT OF INFORMATICS

- ICT for sustainable development
- Information systems
- Data science

DEPARTMENT OF INFORMATION SCIENCE

- Knowledge management strategies
- Knowledge management strategies
- Information architecture

DEPARTMENT OF ENGINEERING AND TECHNOLOGY MANAGEMENT

- Regulatory systems
- Sustainability project management