

FoSE PhD research areas

Advanced Energy and Environmental Materials & Technologies

Head of Research Group: [Prof. Cheng Heng Pang](#)

Advanced Composite Materials, Granular Materials and Geotechnology and New Energy and Environmental Materials

Advanced and Intelligent Manufacturing

Head of Research Group: [Prof. Xiaogang Yang](#)

Conventional & Non-conventional Material Removal Processes, Processes for Adding Materials, Modelling, Dynamics and Control of Manufacturing Processes, Reactive Manufacturing Processes, Automation of Manufacturing Processes and Process Planning and Lean Production

Artificial Intelligence and Optimisation

Head of Research Group: [Prof. Ruibin Bai](#)

Computational Intelligence, Computer Vision and Image Processing, Transportation Analysis and Optimisation, Big Data, Health Informatics and Biomedical Informatics, Data Mining, Machine Learning, Software Testing, Computer Security, Computability and Complexity Analysis, Internet of Thing, Algorithms, Logic, Information Visualization, Human-Computer Interaction, Edge Computing, Deep Reinforcement Learning, 5G, Intelligent Sensors, Computational Economics

Composites

Head of Research Group: [Prof. Xiaosu Yi](#)

Carbon fiber reinforced composites for aerospace, electrically conductive composites, lightning-strike protection composites, biomedical composites and application, bio-sourced resins and green composites, material recycling, composite manufacturing, composite modelling and simulation, structural damping composites, fire-retardant materials, noise absorbing and acoustically dark materials, 3D printing of composites, and thermoplastic composites

Fluids and Thermal Engineering

Head of Research Group: [Dr. Yong Shi](#)

Micro/nanoscale flows, mass and heat transfer, Design of microfluidics and lab on a chip, Thermal management for energy systems, multiscale (micro, meso and macro) modeling, physicochemical transport processes in energy conversion and storage devices (batteries, fuel cells, internal combustion engines and supercapacitors), thermal issues in intelligent manufacturing and 3D printing, Kinetic theory of gases, Space micropropulsion, multiphase flows and heat transfer, sustainable energy technologies, Machine learning approaches for thermofluids and energy analyses

Geospatial and Geohazards

Head of Research Group: [Dr. Nicholas Hamm](#)

Engineering Surveying and Space Geodesy, Remote and in situ measurement, Positioning and Navigation Technologies, Building Information Modelling and Management, Remote Sensing, Geographic Information Science, Geospatial and Environmental Data Science, Geohazards

Natural Resources and Environment

Head of Research Group: [Prof. Jun He](#)

Air Quality and Pollution Control, Urban Climate Change, Water Quality and Wastewater Treatment, Aquatic Resource and Soil Management, Solid Waste Management and Treatment

Partial Differential Equations

Head of Research Group: [Prof. Behrouz Emamizadeh](#)

Nonlinear Partial Differential Equations, Calculus of Variations, Nonlinear Analysis, Rearrangement Optimization Problems, Free Boundary Problems, Free Discontinuity Problems, Regularity of Solutions, Fractional Differential Equations, Shape Optimization Problems, Eigenvalue Problems, Overdetermined and Symmetry Problems, Numerical Analysis, Finite Element Methods, Error Estimates, Mathematical modeling, Blow up problems in fluids, Navier-Stokes equations, Pattern formation, asymptotic methods, Childress conjecture on the Keller-Segel model and their generalization for several chemotactic species

Power Electronics, Machines and Control

Head of Research Group: [Prof. Chris Gerada](#)/[Prof. He Zhang](#)

Power Electronics, Novel Electrical Machine Topologies, Drive Control, Mechanical Design, Thermal Management, Diagnostics and Health Monitoring, Power Converter, More Electrical Aircraft, Aerospace Electrification, New Energy Vehicle, Transport Electrification, Servo Motor Drive

Sensor, Sensor Networks, and Instrumentation

Head of Research Group: [Prof. Vladimir Brusic](#)

Health and Wellbeing (Medical Imaging, OMICS, Health Monitoring), Smart Systems (Smart Home/Office, Smart Vehicle, Smart Health), Applications of Sensors and Instruments (Diagnostics, Prognostics, Optimization)

Sustainable Built Environment

Head of Research Group: [Dr. Wu Deng](#)

The SBE Research Group aims to promote multidisciplinary research across two broad research themes: Architecture and urbanism (A + U), and Architectural Engineering, Environmental Design and Energy (AEDE). Among the many research topics that arise from the built environment, the following are of particular interest to the SBE Research Group:

- Architectural humanity and history across various cultures, climates and geographic locations;
- Past and contemporary urban transition and related sustainability issues in China and beyond;
- Identification of best practices in the area of sustainable building and city development;
- High performance building technologies and system integration

Science and Engineering Education

Head of Research Group: [Dr. Sherif Welsen](#)

Digital transformation in higher education, Online and blended learning, Future of the engineering education, Scholarship of teaching and learning, Development of engineering educators, Engaging undergraduate students in research, Student-centered learning environments, Data-driven engineering education, Lifelong learning in a changing world, Game-based learning and gamification for engineering education, Lab concepts (traditional, online, remote, pocket) in engineering education, University and industry/institutions and connections.