

**MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY,
WEST BENGAL**

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NOTICE

Research scholars and supervisors are advised to pursue the following broad thrust areas for undertaking PhD programmes in different disciplines. The following areas are indicative and not exhaustive.

Research Areas in Mechanical Engineering

1. Biomechanical Engineering & Health
2. Controls & Dynamics of Control Systems
3. Energy Science & Technology
4. Green & Sustainable Technologies
5. Micro & Nano Engineering
6. Combustion & the Environment
7. Transportation Systems
8. Ground Vehicle Systems
9. Manufacturing
10. Multibody Dynamics in Design & Analysis of Rural Engineering Systems
11. Artificial Intelligence Applications in Mechanical Engineering
12. Robotics

Research Areas in Civil Engineering

1. Bridge Engineering
2. Computational Engineering Mechanics
3. Environmental & Water Resources Engineering
4. Geomechanics, Geotechnical & Geoenvironmental Engineering
5. Structural & Earthquake Engineering
6. Transportation System Engineering
7. Damage & Fracture Mechanics
8. Rock Mechanics
9. Stochastic Hydrology & Watershed Hydrology
10. Mechanics of Materials

Research Areas in Electrical Engineering

1. Control, Intelligent Systems and Robotics
2. Communications & Networking
3. Cyber Physical Systems & Design Automation
4. Design, Modelling & Analysis
5. Integrated Circuits & Power electronics
6. MEMS/NEMS
7. Signal Processing
8. Solid State Electronics
9. Optics & Photonics
10. Energy System
11. Sensor & System
12. Data Science

13. Biomedical Devices & Imaging
14. Embedded Systems
15. Energy Efficient Hardware Systems
16. Software Defined Networking
17. Solar Cells & Photovoltaics

Research Areas in Computer Science & Information Technology

1. Artificial Intelligence & Robotics
2. Computational Architecture & Engineering
3. Bio systems & Computational Biology
4. Cyber Physical Systems & Design Automation
5. Database Management Systems
6. Graphics & Multimedia
7. Human- Computer Interaction
8. Operating Systems & networking
9. Programming Systems
10. Scientific Computing
11. Security of Computer Systems & Support for Digital Democracy
12. Quantum Computer
13. Computer assisted education
14. Large scale networking
15. Verification Proofs and Automated Debugging
16. Data Mining, machine Learning and Natural Computation
17. High Performance Computing
18. Signal Processing & Image Analysis
19. Cloud Computing
20. Fog Computing
21. Game theory
22. Automata Theory-Cellular Automata
23. Wireless Sensor network
24. Adhoc Network
25. Accelerated Network technologies
26. Automated Analysis & Verification
27. Computer Graphics
28. Evolvable Hardware
29. Fault tolerated Systems, Diagnostics & Testing
30. Formal Models
31. Hardware Software Co design
32. High Performance Computing
33. Image & video Processing
34. Information & Database systems
35. Intelligent Systems
36. IT security
37. Knowledge technology
38. Networked & embedded system
39. Robotics
40. Supercomputing technologies
41. Speech Data mixing

42. System Modelling & optimization
43. Unconventional Digital Circuits
44. Big data
45. Information Infrastructure
46. ICT for Development
47. Internet Freedom
48. Social Interaction/Networking/Media
49. Block chain & Crypto currency
50. Internet of Things
51. Data Management & Analysis
52. Machine Learning & Deep Learning
53. Cryptography
54. Pattern Recognition
55. Information Retrieval
56. Signal Processing
57. Smart City
58. Social Networks

Research Areas in Electronics & Communication

1. Applied Electromagnetics & RF Circuits
2. Communications
3. Computer Vision
4. Control Systems
5. Embedded Systems
6. Energy Science & Engineering
7. Integrated Circuits & VLSI
8. MEMS & Microsystems
9. Optics & Photonics
10. Plasma Science & Engineering
11. Power & Energy
12. Quantum Science & Technology
13. Robotics & Autonomous Systems
14. Solid State Devices & Nanotechnology
15. Sensor Network Design

Research Areas in Chemical Engineering

1. Catalysis & Reactions
2. Bimolecular Engineering
3. Cellular Engineering
4. Computing & Simulation
5. Nanotechnology
6. Materials
7. Polymers & Complex Fluids
8. Sustainable Energy
9. Micro fabricated Systems
10. Energy & Fuels
11. Environmental Sustainability
12. Petroleum Engineering

13. Process system Engineering
14. Transport, Thermodynamics, Colloids & Interface science
15. Big data and data Science in Chemical Process Industries
16. Artificial Intelligence in Chemical Process Industries

Research Areas in Instrumentation Engineering

1. Novel Actuation & Sensor technology
2. Bio robotics & Bioinstrumentation
3. Control of Complex Systems
4. Precision Instrumentation
5. Autonomous Robotics Vehicle
6. Optics
7. Artificial Intelligence in Process Control
8. Advanced Process Control and Real Time Optimization
9. Analysis & Simulation of very large scale circuits
10. Embedded Control
11. Electromagnetic field computations for building circuits with better performance
12. Data Estimation & filtering
13. Information Encryption and coding error control

Research Areas in Biotechnology

1. Biomaterials
2. Cancer Biotechnology
3. Nanotechnology
4. Microbial & Environmental Biotechnology
5. Diagnostics & Medical Devices
6. Sustainability & Global Health Biotechnology
7. Synthetic & Systems Biology
8. Drug Discovery & drug delivery
9. Cardiovascular Biology & Transplantation biology
10. Developmental Biology & Neurobiology
11. Microbial Genetics, Genomics & Biotechnologies
12. Genomics & Biotechnology of insects of agricultural & medical importance
13. Pharmacology & Toxicology
14. Molecular Microbiology
15. Plant Cell Biology
16. Molecular Basis of Human Pathologies
17. Biochemical Process Engineering
18. Immunology & Nanotechnology
19. Nano biotechnology

Research Areas in Bioinformatics

1. Bioinformatics & computational Biology
2. Genetics & Genomics
3. Systems Biology
4. Structural Bioinformatics
5. Sequence Analysis
6. Text mining and ontologies

7. Computational evolutionary biology
8. Measuring biodiversity
9. Gene expression analysis
10. Protein expression analysis
11. Analysis of mutation in cancer
12. Structure Prediction
13. Modelling Biological systems
14. High throughput image analysis

Research Areas in Applied Mathematics

1. Combinatorics
2. Computational Biology
3. Physical Applied Mathematics
4. Computational Science & Numerical Analysis
5. Theoretical Computer Science
6. Mathematical medicine and Virology
7. Mathematical Physics
8. Fluid Mechanics
9. Control and Dynamical systems
10. Scientific Computing
11. Mathematical Finance
12. Dynamical Systems
13. Optimization
14. Probability & Stochastic process
15. Communication technology
16. Algorithms

Research Areas in Applied Physics

1. Astrophysics & Plasma Physics
2. Atomic , Molecular & Chemical Physics
3. Biophysics
4. Condensed Matter Physics & Material Science
5. Energy
6. Nano science & nanotechnology
7. Optical Physics, Quantum Electronics& Photonics
8. Lasers

Research Areas in Applied Chemistry

1. Synthetic organic & bioorganic Chemistry
2. Preparative main group and transition metal chemistry
3. Organometallic Chemistry
4. Structural organic and inorganic chemistry
5. Cluster Chemistry
6. New synthetic and asymmetric methodology
7. Catalysis & high pressure chemistry
8. Parallel & high throughput synthesis
9. Molecular reaction dynamics
10. Solution State kinetics & reaction mechanism

11. X-ray crystallography
12. NMR spectroscopy (Solution & Solid State)
13. The chemistry of surface & interfaces
14. Functional Materials
15. Fullerene & Carbon nanotube chemistry
16. The chemistry & physics of electronic & photonic materials
17. Supramolecular Chemistry
18. Chemistry of carbohydrates, proteins & lipids
19. Innovative Fluorination Methodology

Research Areas in Industrial Engineering & Management Science

1. Applied Statistics & Statistical Learning
2. Financial Engineering
3. Healthcare Engineering
4. Optimization
5. Quality Design and Control
6. Management Science
7. Logistics & Operations
8. Stochastic Analysis & Simulation
9. Cognition and Decision Making
10. Next Generation Products & Services
11. Computational IE
12. Complex Systems & Networks

Research Areas in Ceramic Technology

1. Thermal & Environmental Barrier Coatings
2. Gel casting & novel fabrication techniques in ceramics
3. Cellular ceramics
4. Solid oxide Fuel Cell Materials
5. Oxide Ferroelectrics
6. Oxide Multiferroics
7. Nanolithography
8. Ceramic thin film and multilayers
9. Ceramic Phase Diagrams
10. Transparent Conducting Ceramics
11. Transparent Oxide Semiconductors
12. Bio ceramics
13. Composites
14. Ceramics in Energy & Environment
15. Nano ceramics
16. Artificial Intelligence in Ceramics
17. Big Data & Data Science in ceramics
18. Optical Ceramics
19. Surface & Interfaces in Ceramics

Research Areas in Textile Technology

1. Nanotechnology
2. Artificial Turf

3. Smart Textiles
4. Functionalization of textile Materials
5. Polymer Technology and Biopolymers
6. 3D textiles and Preforms
7. Textile Architecture

Research Areas in Management Science

1. Managing Technology & Innovation
2. Resource management & Sustainable development
3. Social Entrepreneurship
4. Corporate Responsibility, ethics & accountability
5. Accounting & Finance
6. Rural Management
7. Consumer behavior
8. Advertising & Branding
9. Business ventricles
10. Creativity
11. Cross Cultural & Cross Border Issues
12. Developing Countries & Economics
13. Emerging markets, Marketing Strategy
14. Entrepreneurship
15. Forecasting & predicting
16. Governance
17. Health care & treatment
18. Human Resources
19. Intellectual Property & Knowledge management
20. Management Analysis, Tools & Techniques
21. Environment management
22. Block Chain and Crypto currency
23. Information management
24. Internet and Digital Marketing

Projects in Food Technology thrust areas

1. Application of high pressure technology in Food processing.
2. Ohmic heating in Food processing technology.
3. Microwave technology and microwave assisted Freeze drying.
4. Extraction of starch from non-conventional sources and its modification to change the functional properties of food.
5. Fibre enriched extruded product from fruit sources.
6. Extrusion porosification of Food and its application in the preparation of instant milk Powder.
7. Soya based fermented symbiotic food.
8. Supercritical fluid extrusion .
9. Utilisation of locally available fruits for wine preparation and utilization of by- product in development of bakery and extruded foods.
10. Symbiotic and probiotic frozen product
11. Membrane separation technology for whey processing Enzymatic and chemical modification of whey protein isolate.
12. Anaerobic process of waste water treatment and Biofuel generation

13. Food protein modification and study of surface properties of protein.
14. Biodiesel preparation from waste inferior grade edible oils
15. Inter esterification technology of oils and generation of tailored made plastic fat for use in different bakery and confectionery items
16. Application of inter esterified fat for preparation of Vegetable ice-cream Mallorine
17. Functional food and nutraceuticals and food Fortification
18. Supercritical fluid extraction and flavor Technology
19. Application of distillery waste and fruits peels for edible flexible packaging generation
20. Value addition in Tea
21. Production of Nutritionally balanced ready to eat shelf stable high shelf life food for mid-day meal purpose
22. Production of Bacteriocin a Food grade antibiotics
23. Application of solvent extraction coupling with fermentation in alcohol production to maximize yield and minimize time of fermentation.
24. Pulse electric field, Irradiation technology
25. Value addition of agro waste
26. Food Packaging
27. Application of Technology for food preservation and processing in rural sector
28. Health drinks
29. RTE packaged food development
30. Socially relevant issues pertaining Food Nutrition and safety

Research scholars and PhD supervisors may take up research in the following areas also :

1. Rural Engineering, Technology and Management
2. Addressing issues having Industrial applications
3. Addressing issues having Societal applications

by order