Department and their subtopics for SURGE & SARIP Internship

1. Aerospace Engineering

- Unmanned air vehicles
- Aerodynamics
- Computational Fluid Dynamics
- Aircraft Structures
- Flight Mechanics
- Propulsion and Combustion
- Optical flow diagnostics
- Physics-assisted machine learning methods
- Sports Aerodynamics
- Fluid-Structure Interactions
- Computational solid mechanics
- Aerospace materials
- Structural Health Monitoring

2. Biological Sciences & Bioengineering

- Cell & Molecular Biology
- Genetics & Developmental Biology
- Structural & Computational Biology
- Bioinformatics
- Bioremediation
- Tissue Engineering
- Bioprocess Engineering
- Drug Delivery Systems
- Microbiology
- Mental Health and neurosciences
- Cancer Biology/ Molecular Oncology
- Biophysics
- Bioimaging
- Biomedical Devices
- Computational Biology

3. Civil Engineering

- Environmental Engineering
- Geoinformatics
- Geotechnical Engineering
- Hydraulics and Water Resources Engineering
- Infrastructure Engineering and Management
- Structural Engineering
- Transportation Engineering

4. Chemical Engineering

- Reaction Engineering
- Modelling and Simulation of Separation processes
- Environmental remediation
- Nanoscience and nanotechnology
- Energy and Sustainability
- Fluid Mechanics: Theory, Experiments and Computations
- Bio-mimetic engineering
- Rheology
- Biotechnology
- Softmatter

5. Chemistry

- Synthetic Organic Chemistry
- Chemical Biology
- Organic and Inorganic Materials
- Organometallic Chemistry
- Supramolecular Chemistry
- Bio-inorganic Chemistry
- Catalysis
- Surface and Interface
- Statistical Mechanics
- Theoretical Chemistry
- Solid State and Material Chemistry
- Spectroscopy and Imaging

6. Computer Science & Engineering

- Theoretical computer science
- Algorithms
- Machine learning, data mining, computer assisted instruction
- Internet and mobile technologies and computing
- Computer Systems

- Cyber Security

7. Design Programme

- Advanced Product Design
- Intelligent System Design
- Bio-medical Devices
- Space Applications

8. Electrical Engineering

- Power & Control
- Signal Processing, Communications & Networks
- RF, Microwaves and Photonics
- Microelectronics, VLSI and Display Technologies

9. Earth Sciences

- River Science
- Natural hazards
- Rock deformation & rock physics
- Water & Climate studies
- Geochemistry
- Applied and solid earth Geophysics
- Remote sensing & GIS applications

10. Economics Sciences

- Efficiency and Productivity Analysis
- International Economics
- Applied Econometrics

11. Mechanical Engineering

- Solid Mechanics and Design
- Fluid Mechanics and Thermal Sciences
- Manufacturing Science
- Robotics and Automation

12. Material Science and Engineering

- Electronic & Functional Materials and Devices
- Physical/Mechanical Metallurgy
- Computational Materials Science

- Bio-Materials Science
- Electrochemistry & Corrosion Science
- Extractive/ Process/Powder Metallurgy
- Energy & Environment Related Materials

13. Humanities & Social Sciences

- Economics
- English
- Fine Arts
- Psychology
- Philosophy
- Sociology

14. Department of Management Science and Engineering

- Energy/Renewable Energy
- Marketing
- Manufacturing Systems Management
- Industrial Engineering and Operations Research
- Production and Operations Management
- Decision Sciences
- Multi Criteria Decision Making
- Multi Objective Optimization
- Portfolio and Investment Analysis
- Quantitative Finance
- Risk Analysis
- Robust and Reliability Optimization
- Operations Research
- Data Science and Machine Learning
- Supply Chain Management (Digital and traditional)
- ICT for development
- Strategic business implications of Information Systems
- Emerging technologies and business impacts
- Human Resource Management
- Organizational Behaviour
- People Analytics

15. Physics

- Condensed matter Experiment
- Laser Physics Experiment
- Ion Beam, Plasma and Nuclear Solid State Physics

- Theoretical Physics

16. Mathematics & Statistics

- AI/ML/DL & Applications
- Algebra
- Analysis
- Computational Fluid Dynamics
- Differential Equations
- Mathematical Biology
- Nonlinear Dynamics
- Numerical and Computational Mathematics
- Optimization
- Probability
- Statistics
- Stochastic Differential Equations

17. Nuclear Engineering & Technology

- Transport Theory
- Tomography
- Fusion and Plasma Physics
- Nuclear Safety
- Nuclear Reactor Dynamics
- Radiation Detectors
- Multi-phase Flow Measurements
- Nondestructive Testing

18. Cognitive Science

- Investigating Action planning and Control in VR environment
- Role of Control in influencing Sense of Agency and Sense of Ownership
- Episodic Memory in the digital world
- Emotion classification for dynamic facial expressions
- Characterizing Neuro-cognitive States using Brain-Gut coupling
- Neuro-cognitive behavioural tools for personalized treatment strategies
- Social and affective decision making

19. Sustainable Energy Engineering

- Solar Photovoltaics
- Energy Storage

- Solar Thermal
- Wind Energy
- Fuel Cells
- Hydrogen
- Carbon Capture and Utilization
- Water
- Smart Grid and Renewables Integration
- Energy Policy and Regulation

20. Photonics Science and Engineering Programme

- Hydrogen
- Solar Photovoltaics
- Energy Storage
- Solar Thermal
- Wind Energy
- Fuel Cells
- Carbon Capture and Utilization
- Water
- Smart Grid and Renewables Integration
- Energy Policy and Regulation

21. Space, Planetary & Astronomical Sciences & Engineering

- Astronomy and Astrophysics
- Planetary Science and Technology
- Space and Astronomical Instrumentation
- Space weather and its effect on spacecrafts

22. Department of Intelligent Systems

- AI for STEM education
- Robotics and AI/ML
- Theoretical security/Number theory
- Applied cryptography and Cybersecurity
- Application of AI/ML on computer security and vice versa
- Extended target tracking, classification and Sensor fusion in areas of intelligent autonomous driving using FMCW radar, Camera, lidar and V2X sensors
- Multi UAV sense and collision avoidance system for non cooperative targets
- UAV based surveillance and reconnaissance systems (Sensor data and information fusion including situational & threat assessment using different Radar (GMTR, OTH, Passive, AWACS etc.), EO/IR, AIS, IFF and Satellite information)

- IMU, Baro, Magnetometer, GNSS/SBAS fusion for autonomous Hybrid Navigation
- GNSS denied navigation - Receiver's autonomous integrity monitoring (RAIM); application of Terrain referencing & concept of image registration; Indoor Navigation & Slamming techniques for MAV systems and mobile robots (UGV)
- UAV autopilot flight Control law and intelligent fault tolerant control design
- Fighter aircraft situational assessment for aerial defense and offensive application
- Machine learning for 6G wireless systems
- Optimization for 6G wireless systems
- 6G Wireless systems design