Area of Online Internship for the Undergraduate Students

Name of Faculty Mentor	Area of Online Internship	Remarks
Department Of Astronomy, Astrophysics And Space Engineering (DAASE)		
Dr. Saurabh Das	1. Weather prediction using ML/AI. 2. Space weather 3. Remote Sensing 4. Satellite based navigation and GNSS/GPS 5. Satellite communication 6. IoT and android 7. Pulsar Based Navigation	
Dr. Abhirup Datta	1. Astronomy, Astrophysics and Space Sciences 2. Cosmology 3. Radio Astronomy - Observations and Instrumentation 4. Statistics and Machine Learning Applications in Space 5. Square KIlometre Array - related simulations 6. Space Weather and Ionosphere 7. NaVIC and GPS applications 8. X-ray Astronomy	
Dr. Amit Shukla	1. Active galactic nuclei 2. Blazars 3. FSRQ 4. Radio galaxies 5. Seyfert Galaxies 6. Gamma-ray bursts (GRBs) 7. Pulsars	

	8. X-ray binaries 9. Jet launching mechanisms 10. High Energy Astrophysics 11. Gamma-ray Astronomy 12. Time-domain astronomy 13. Multi-wavelength & multi-messenger astrophysics 14. Particle acceleration in astrophysical sources	
Dr. Siddharth S Malu	1. Machine Learning and Computational Intelligence across disciplines	
Dr. Unmesh Govind Khati	1. Microwave remote sensing 2. Lidar remote sensing 3. Python for Earth science data analysis 4. Google Earth Engine	
Dr. Bhargav Vaidya	1. Space Weather Modelling 2. Astrophysical Plasma 3. Computational Fluid Dynamics 4. Turbulence 5. Numerical Methods in Space Sciences	
Dr. Manoneeta Chakraborty	1. Neutron star 2. Black holes 3. Pulsars 4. Magnetars 5. X-ray binaries 6. Accretion physics 7. Burst physics	
Department of Biosciences and Biomedical Engineering (BSBE)		

Dr. Parimal Kar	1. Computer Aided Drug Design 2. Computer Modeling of Protein Dynamics	
Dr. Hem Chandra Jha	1. Bacteria (Helicobacter pylori) and virus (Epstein Barr Virus) mediated gastric and oral cancer progression. 2. Epstein Barr Virus mediated neurodegeneration such as Multiple sclerosis and Alzheimer. 3. Cerebral malaria- An conjuncture of Plasmodium and Epstein Barr virus. 4. How SARS-CoV-2 influences so rapidly?	
Dr. Mirza S. Baig	1. Principles of Disease Modelling, Target Identification, and Drug Discovery	
Dr. Kiran Bala	1. Phycotechnology 2. Bioremediation/wastewater treatment 3. Algal Biofuels 4. Biopolymers: Process and Optimization 5. Algal Biorefinery	
Professor Ganti S. Murthy	1. Sustainable Bioprocessing 2. Systems Analysis for sustainability	
Dr. Sunil Kumar Boda	1. Biomaterials and Tissue Engineering 2. Biofabrication 3. Nanobiotechnology	
Professor Avinash Sonawane	1. Drug development for tuberculosis and blood cancer 2. Host pathogen interaction and host cellular immunity 3. Drug delivery	
Department of Chemistry		

Dr. Shaikh M. Mobin	1. Design and Synthesis of Inorganic Complexes and Metal Organic Frameworks (MOFs) and Covalent Organic Frameworks (COFs) for energy storage, energy conversion and energy generations, bio-medical and catalysis. 2. Applications in Catalysis via Single Source Molecular Precursors and Nanomaterials and Crystal Engineering (Structural reactivity). 3. Employing small molecule (organic ligands and complexes) for bioimaging, cellular targets and sensing. 4. Generation of C-dots/graphene via green source and its applications in wound healing and other bio-medical applications.	
Dr. Chelvam Venkatesh	1. Total synthesis of biologically important natural products 2. Design and synthesis of heterocycles and carbocycles of biological importance 3. Developing new methodologies for construction of C-C and C-X (X=N, O, S, P) bonds 4. Design, synthesis and diagnostic applications of new targeting ligands for cancers and inflammatory diseases 5. Drug delivery systems, near-infra red fluorescence, nuclear Imaging and bio-conjugate chemistry 6. Synthesis of Inhibitors for drug targets	
Dr. Sampak Samanta	1. Organocatalytic Asymmetric Transformations 2. Domino Approaches to Heterocyclic Synthesis 3. Spectroscopic Techniques (IR, NMR, MS etc) for the Characterization of Organic Molecules	
Dr. Apurba K. Das	1. Engineering of Organic-inorganic Nanohybrids for Energy Storage 2. Engineering of Organic-inorganic Nanohybrids for Energy Conversion 3. Fabrication of Supercapacitor Devices	
Dr. Sanjay Singh	1. Catalysis 2. Hydrogen Production and Storage 3. CO2 capture and Utilization	

	4. Biomass transformation and Biofuel	
Professor Suman Mukhopadhyay	1. Bioinorganic chemistry 2. Metals in medicine 3. Molecular Recognition	
Department of Civil Engineering		
Dr. Gourab Sil	1. Performance Based Geometric Design of Highways 2. Effects of roadways infrastructure on driver behaviour 3. Pedestrian Safety Evaluation	
Dr. Guru Prakash	1. Degradation modeling 2. Structural health monitoring 3. Reliability 4. Damage detection 5. Damage prognosis	
Dr. Neelima Satyam	1. Application of machine learning in a landslide forecasting 2. Discrete element modeling of stabilized clay 3. Multivariate analysis of MICP treated sand	
Dr. Sandeep Chaudhary	1. Structural Engineering 2. Sustainable Construction Practices 3. Composite Bridges 4. Novel Bricks and Blocks 5. Microstructure and Durability of Concrete 6. Advanced Characterisation Techniques	
Dr. Mohd Farooq Azam	1. Hydro-Meteorological monitoring 2. Glacier Mass and Dynamic studies 3. Energy Balance of Glacier and Snow Cover	

	4. Hydrological modelling of Himalayan Watersheds 5. Climate Change impacts on Himalayan Water Resources	
Dr. Lalit Borana	1. Unsaturated Soil Mechanics 2. Fiber optic sensors in Geotechnical Engineering & Geotechnical health monitoring 3. Soil-Structure Interface 4. Soft Soil and Creep 5. Ground Improvement Techniques	
Dr. Mayur Shirish Jain	1. Waste Management 2. Water Quality Assessment 3. Green Building Assessment 4. Sustainability Assessment of Smart Cities 5. Air Quality Assessment 6. Computer Applications in Environmental Engineering 7. Impact of Anthropogenic Activities on Biodiversity and ecosystem	
Dr. Priyank J. Sharma	1. Climate Change Impact Assessment 2. Flood Forecasting and Mitigation 3. Study of Hydroclimatic Extremes 4. Basin-scale Hydrologic Modelling	
Dr. Kaustav Bakshi	1. Design of multistoried RCC buildings (superstructures and substructures) under gravity and lateral loads using IS codes and Staad.Pro 2. Design of steel factory shed (superstructures and substructures) under gravity and lateral loads using IS codes and Staad.Pro 3. Design of steel-concrete factory shed (superstructures and substructures) under gravity and lateral loads using IS codes and Staad.Pro 4. Determination of lateral loads for RCC and steel buildings using relevant IS codes 5. Design of simple RCC bridges using IRC and IS codes	

	6. Design of simple water retaining structures using IS codes 7. Basics of finite element analysis 8. A training on computer code writing for solution of simple civil engineering problems.	
Dr. Saikat Sarkar	1. Crack propagation and failure of structures 2. Metamaterials for civil engineering applications 3. Structural health monitoring and damage detection 4. Structural optimization	
Professor Manish Kumar Goyal	1. **Climate change** Impact of climate change on water resources Statistical Downscaling Climate variability and change detection 2. **Hydrology and Glaciology** Hydro-Climatology Hydrological Modeling and Flood Routing Snow-melt Hydrology Glacial Lake Changes Hydro-geoInformatics Remote Sensing Applications 3. **Irrigation** Crop modeling Irrigation Water Management 4. **Data Mining applications in water management and climate change** Multivariate Statistical Analysis Machine Learning Models -Neural Network, Fuzzy logic, clustering	
Department of Computer Science and Engineering		
Dr. Anirban Sengupta	1. Computer Processor Design and Security	

Dr. Neminath Hubballi	1. Network Security 2. Computer Networks 3. Digital Forensics	
Dr. Chandresh Kumar Maurya	1. An intelligent recommendation-cum-reminder system 2. Natural language processing for text data	
Dr. Nagendra Kumar	1. Deep Learning 2. Social Network Analysis 3. Natural Language Processing	
Dr. Bodhisatwa Mazumdar	1. Fault Analysis of authenticated encryption primitives. 2. Logic Synthesis Techniques for Improved Resilience Against Fault Attacks. 3. Machine Learning Based Side Channel Analysis of Cipher Algorithms and Implementations.	
Professor Narendra S. Chaudhari	1. Network security and mobile comp 2. Artificial Intelligence and Machine Learning (AI-ML) 3. Theory of computation and related areas of applications (web searches, algorithm design, etc.)	
Dr. Aruna Tiwari	1. Soft-computing 2. Artificial Intelligence 3. Machine Learning 4. Data Mining	
Dr. Puneet Gupta	1. Deep Learning 2. Machine learning 3. Computer Vision	
Dr. Ayan Mondal	1. Computer Networks	

	2. Internet of Things (IoT) Networks 3. Networking for Cloud-enabled sensor networks	
Dr. Aniruddha Singh Kushwaha	1. Computer Networks 2. Software Defined Networking	
Department of Electrical Engineering		
Dr. Abhinoy Kumar Singh	1. Estimation and filtering theory for tracking application 2. Theoretical analysis of continuous glucose monitoring 3. Specified drone design for practical applications	
Dr. Swaminathan R.	1. Space-Air-Ground Integrated Networks (SAGIN) 2. Hybrid Optical-RF Wireless Communication 3. 5G and Beyond Wireless Systems 4. Channel Coding for 5G Communication 5. Non-Line-of-Sight (NLOS) Ultraviolet (UV) Optical Wireless Communication 6. Blind Channel Code and Interleaver Reconstruction Techniques 7. Index Modulation Techniques for Next-generation Wireless Communication 8. Energy Harvesting Schemes for Integrated Optical-RF Networks 9. Non-Orthogonal Multiple Access (NOMA) Techniques 10. Intelligent Reflecting Surface-based Wireless Communications 11. Machine Learning for Communication Systems/Wireless Communications	
Dr. Vivek Kanhangad	1. Signal and Image Analysis 2. Computer Vision 3. Deep Learning 4. Biometrics	
Professor Vimal Bhatia	1. AI/Machine/Deep Learning 2. Wireless Communications	

	3. 5G, 6G 4. Image/Video Processing	
Dr. Santosh Kumar Vishvakarma	1. Energy-Efficient and Reliable SRAM Memory Design 2. Enhancing Performance and Configurable Architecture for DNN Accelerators 3. SRAM based In-Memory Computing Architecture for Edge AI 4. Reliable, Secure Design for IoT Application 5. Design for Reliability	
Dr. Prabhat Kumar Upadhyay	1. Simultaneous Wireless Information and Power Transfer (SWIPT) 2. Cognitive Radio and Spectrum Sharing Techniques 3. Integrated Satellite-Aerial-Terrestrial Systems 4. Physical Layer Security 5. Molecular Communications and Nanonetworking	
Professor Abhinav Kranti	1. Capacitorless DRAM 2. Steep switching transistors 3. AlGaN/GaN HEMTs	
Dr. Shaibal Mukherjee	1. Solar cell 2. RF transistor 3. Artificial neurons/Silicon brain/RRAM for image processing 4. 2D materials for RRAMs 5. Biochemical sensor	
Dr. Saptarshi Ghosh	1. Electromagnetics 2. Frequency selective surfaces 3. Metamaterials 4. Microwave absorbers 5. Microwave/ mm-wave antennas 6. 3-D Printing	

Dr. Mukesh Kumar	1. Integrated Optoelectronics 2. Silicon Photonics; Integrated CMOS Photonics 3. Microwave & RF Photonics, Optical Antenna 4. Devices for Optical Communication & Interconnects 5. Nano-scale devices for Advanced Memory and Computing 6. Nanoelectronics, VLSI Technology & Device Fabrication	
School of Humanities and Social Sciences		
Dr. Kalandi Charan Pradhan	1. Data analysis for the development economics and sustainable development	
Dr. Ananya Ghoshal	1. Modern American Literature 2. The Parallel Cinema Movement in India 3. William Blake- Poet and Printmaker 4. History of Photography 5. Children's Literature	
Dr. Mohanasundari Thangavel	1. Agriculture and Climate change studies 2. Farmer Producer Organization 3. Consumer behaviour and Consumption pattern 4. Energy Economics	
Dr. Ruchi Sharma	1. Economics of Innovation (R&D policy; Innovation by Academic Institutions; Intellectual property policy; Knowledge spillovers; Markets for technology) 2. International Economics (FDI, technology trade and technology transfer) 3. Industrial organization (R&D and Patenting by Firms and Start-ups; Firm performance; Productivity; Industry dynamics)	
Dr. Nirmala Menon	1. Humanities Data 2. Text mining Tools for Textual Data	

	3. Translation Studies 4. Literature and Climate Change	
Dr. Aratrika Das	1. Nineteenth Century British Literature 2. Gothic 3. Medical Humanities 4. Writing Pedagogy	
Dr. Akshaya Kumar	1. Indian film and media studies 2. Comparative media studies 3. Cultural Studies 4. Platform Economy	
Department of Mathematics		
Dr. Mohd. Arshad	1. Statistical Inference 2. Statistical Decision Theory	
Dr. Md. Aquil Khan	1. Mathematical Logic	
Dr. Santanu Manna	1. Mathematical Modelling 2. Local/Nonlocal elastic wave propagation 3. Earthquake Prediction Analysis	
Dr. Bibekananda Maji	1. Number Theory	
Dr. Bapan Ghosh	1. Nonlinear Dynamics and Computations 2. Delay Differential Equations and Applications 3. Fractional Differential Equations 4. Mathematical Biology 5. Numerical Methods and Computations	

Dr. M. Tanveer	1. Machine learning and applications to biomedical data	
Dr. Niraj Shukla	1. Wavelet and Frames in the finite-dimensional vector space 2. Wavelet and Shearlet 3. Shannon Sampling Theorem 4. Dynamical Sampling 5. Fourier Transform on R^n	
Department of Mechanical Engineering		
Professor Anand Parey	1. Noise control of electric vehicles 2. Vibration control of electric vehicles 3. Noise control of drones 4. Vibration analysis of tennis racket 5. Fault detection of Gearbox using vibration analysis	
Dr. Santosh Kumar Sahu	1. Synthetic Jet impingement 2. Jet impingement cooling of curved surfaces 3. Thermal management of electronic components 4. Phase change materials for energy storage	
Dr. Harekrishna Yadav	1. Experimental Fluid Dynamics and Heat Transfer 2. Fluid-Structure Interaction 3. Shear Flow 4. Flow and Turbulence Measurement using Optical Techniques 5. Heat Transfer Enhancement 6. Renewable and Sustainable Energy	
Dr. Shanmugam Dhinakaran	1. Computational Fluid Dynamics (*Bluff body Aerodynamics, Drag reduction techniques)*	*Students with all background in*

	2. Electronic cooling 3. Nanofluids; Non-Newtonian fluid flows 4. Single and multi phase flows 5. Heat pipes 6. Solar thermal collectors 7. Solar air heaters 8. Development of higher order convective schemes 9. Lattice Boltzmann methods 10. Finite volume methods 11. Biofluid Mechanics and Bio-heat transfer 12. Respiratory air flow 13. Blood flow in diseased arteries 14. Catalysis and all other areas in CFD and Heat Transfer **<u>BSBE Department:</u>** 1. Biofluid Mechanics and Bioheat Transfer 2. Biofluids 3. Biological fluid flows 4. Respiratory air flow 5. Blood flow in diseased arteries 6. Drug delivery 7. Cancer treatment 8. Biomedical device development 9. Tissue Engineering 10. Bioenergy 11. Catalysis and all other relevant areas.	*Engineering, Applied Mathematics, Chemistry, Physics, Physical Education, etc. can apply as the topics mentioned are interdisciplinary in nature)* *Students with a background in Engineering, Applied Mathematics, Biotechnology, Life Sciences, Biomedical Engineering, Physical Education (B.P.Ed), etc can apply.*
Dr. I. A. Palani	1. Mechatronics system design 2. Soft robotics systems 3. Micro additive manufacturing	
Dr. Indrasen Singh	1. Finite Element Methods	

	2. Computational Solid Mechanics 3. Fracture Mechanics 4. Crystal Plasticity 5. Piezoelectric materials	
Dr. Girish Chandra Verma	1. Machining process 2. Addictive manufacturing process 3. Ultrasonic assisted machining processes 4. Magnetic field assisted super-finishing process	
Dr. Sandeep Singh	1. Solid mechanics and design 2. Finite element method 3. Theory of plates and shells 4. Computational material science 5. Multiscale modelling of nanomaterials	
Dr. Satyanarayan Patel	1. Piezoelectric materials 2. Ferroelectric materials 3. Pyroelectric materials 4. Energy harvesting and storage materials 5. Solid-state refigeration 6. Smart materials	
Dr. Krishna Mohan Kumar	1. Analysis and Synthesis of Automotive mufflers	
Dr. Ritunesh Kumar	1. Energy needs for buildings 2. Renewable energy air conditioning systems	
Dr. Ankur Miglani	1. Combustion of next-generation fuels: Gel fuels and nanoparticle laden fuels. 2. Thermal management of power-dense electronics: Flow boiling in microchannels 3. Microfluidics: Flow freezing in microchannels	

	4. Soft-matter: Instabilities in drying colloidal droplets	
Dr. Ashish Rajak	1. Metal Forming 2. Metal Joining 3. Composite Materials 4. Advanced Manufacturing Processes 5. Materials Science in High Strain Rate Processes	
Dr. Kazi Sabiruddin	1. Grit blasting for substrate preparation before coating application 2. Plasma sprayed alumina coatings for improved wear resistance 3. D-Gun sprayed alumina-SiC coatings 4. Synthesis of hydroxyapatite from natural resources 5. Chemical vapour deposition (CVD) 6. Physical vapour deposition (PVD) 7. Study of splats: the building block of thermally sprayed coatings	
Dr. Pavan Kumar Kankar	1. Machine Learning 2. Artificial Intelligence and its applications 3. Condition Monitoring	
Department of Metallurgy Engineering and Materials Science		
Dr. Jayaprakash Murugesan	1. Advanced materials joining techniques 2. Mechanical testing of materials 3. Alloy development	
Dr. Ram Sajeevan Maurya	1. Requirements, design and development of Fibre-reinforced plastic (FRP) Composite. 2. Methodology of composite manufacturing techniques. 3. Additive manufacturing	

	4. High entropy Alloys	
Dr. Rupesh S. Devan	1. Nanostructures and Thin film technology 2. Techniques in materials characterization 3. Materials for energy storage 4. Photoactive materials for clean energy	
Dr. Mrigendra Dubey	1. Various aspects of Corrosion Science and Engineering using Comsol multiphysics software 2. Introduction to single-crystal structure analysis 3. Modern techniques for characterization of materials	
Dr. Hemant Borkar	1. Lightweight alloys for automotive applications 2. Microstructural characterization 3. Crystallographic texture and EBSD 4. Advanced materials and processing	
Dr. Santosh S. Hosmani	1. Surface Engineering 2. Severe Surface Deformation 3. Microstructure-Property correlation	
Dr. Ajay Kumar Kushwaha	1. Nanomaterials Synthesis and Characterization 2. 2-D Materials and Devices 3. Thin films and Memristors 4. Next-generation solar cell 5. Applied Electrochemistry 6. Electrochemical Sensors 7. Photo/electrochemical water-splitting 8. Corrosion Analysis and Anti-corrosion Coatings	
Department of Physics		

Dr. Pankaj R. Sagdeo	1. Materials synthesis and characterizations for Solar Cell and related applications 2. Application and characterization of spintronics material.	
Dr. Rajesh Kumar	1. Device Physics 2. Electrochromic Materials and Device 3. Raman Spectroscopy 4. Nanomaterials	
Dr. Raghunath Sahoo	1.The Global Properties of Quark Gluon Plasma (QGP) created in the Big Bang Experiment. [ALICE Experiment at LHC, CERN, Switzerland] 2. Exploration of QCD Phase Diagram and search for the Critical Point 3. Matter formed at High Baryon Densities[Compressed Baryonic Matter Experiment (CBM), GSI, Darmstadt, Germany] 4. Phenomenology of Quark-Gluon Plasma 5. GRAPES-3 (Gamma Ray Astronomy PeV Energies) 6. Applications of Machine Learning and Artificial Intelligence in High-Energy Physics 7. Applications of Statistical Mechanics in High-Energy Physics	
Dr. Somaditya Sen	1. Semiconductors 2. Magnetic and Ferroelectric oxides 3. Structural and Electrical property measurements 4. Nano materials	
Centre for Rural Development and Technology (CRDT)		
Professor Sandeep Chaudhary	1. Sustainable Construction Technology for Rural Development 2. Novel Building Products for Rural Area	

Important Note:

1. **Fees once paid is non-refundable.**
2. **The Undergraduate Students are requested to contact concerned faculty mentor for any query/clarification.**
3. **Consent from the faculty mentor of IIT Indore is a must.**