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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Jogeswar S Purohit |
| **Title of Project** | In silico analysis of SWI/SNF chromatin remodeling complexes |
| **Duration** | 6 months to 1 year |
| **No. of Students** | 03 |
| **Related fields of study** | Computational Biology |
| **Nature of work** | Modelling, Docking and Network building, expression analysis |
| **Credits** | |
| **Abstract** | SWI/SNF is one of the type of ATP dependent chromatin remodeling complex responsible for remodeling chromatin and regulation of gene expression. The SWI/SNF is a multiprotein complex however; its subunit composition varies among organisms and tissues. In the proposed project is aimed at determining the minimal SWI/SNF complex in chicken and investigate its tissue specific micro-heterogeneity by modeling, docking and network analysis. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Prof Shobha Bagai |
| **Title of Project** | Application of Group theory to Rubik Cube |
| **Duration** | 2 – 3 months |
| **No. of Students** | 3 - 4 |
| **Related fields of study** | Mathematics |
| **Nature of work** | Only students who are really keen on mathematics must opt for this project |
| **Credits** | 4 or 6 |
| **Abstract** | Everybody has solve a 3 x 3 Rubik Cube. The solution can be elegantly presented using Group Theory. The Mathematics behind the usual solution of a regular 3 x3 Rubik Cube is already available in literature (please see the references). The aim of this project would be to generalize the solution to a higher dimensional Rubik Cube. Different variations of the Rubik Cube can also be explored. |
| **Reference** | 1. The Mathematics of the Rubik's Cube (https://web.mit.edu/sp.268/www/rubik.pdf)<br>2. A mathematical approach to solving a Rubik Cube (http://www.math.ubc.ca/~cass/courses/m308/projects/rtran/rtran.pdf) |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Mahima Kaushik |
| **Title of Project** | Exploring Carbon Nanotubes Based Cultured Neurons. |
| **Duration** | 3-6 months |
| **No. of Students** | 2 |
| **Related fields of study** | Nano-biotechnology, Cognitive Science |
| **Nature of work** | Computational / Practical |
| **Credits** | 4 |
| **Abstract** | To demonstrate that the electrical simulation produced by single-wall carbon nanotubes (SWCNTs) can indeed induce neuronal signaling, Mazzatenta et al. (2007) developed an integrated SWCNTs neuronal system and demonstrated that hippocampal cells can be grown on pure SWCNTs substrates. Their experimental results point to the fact that SWCNTs can be directly used to stimulate brain circuit activity. These results may have a remarkable impact on the future developments and architectural design of microsystems for neural prosthetics (Mazzatenta et al., 2007). For this project, we would like to study a particular brain circuit in detail (preferably Blood Brain Barrier or Amygdala and Hypothalamus) and would like to suggest that how we can actually integrate the cultured neuron in any of the particular structure to improve the functioning or further to cure and particular kind of disease of that brain circuit. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Mahima Kaushik |
| **Title of Project** | Development of a 3D multiplayer action/strategy game |
| **Duration** | 3-6 months |
| **No. of Students** | 2 |
| **Related fields of study** | Information technology |
| **Nature of work** | Designing and creation using various softwares |
| **Credits** | 4 |
| **Abstract** | This project aims to create a 3D multiplayer action / strategy game during this semester long project. The game is still in an ideation phase but the aspects finalized are namely its perspective being first person, the theme is mostly inspired by chess but the game won't be chess itself. The concept taken from chess is mostly the way each specific player type moves and we would use to make an action oriented variant of chess. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Mahima Kaushik |
| **Title of Project** | Computational Studies of Corona Virus and various drugs/ ligands |
| **Duration** | 3-6 months |
| **No. of Students** | 2 |
| **Related fields of study** | Bioinformatics, computational biology |
| **Nature of work** | Computational / Bioinformatics/ Practical |
| **Credits** | 4 |
| **Abstract** | World is experiencing Coronavirus pandemic since last almost a year now. It is a very severe contagious, respiratory disease, which has taken lives of millions of people till now, due to the lack of specific drugs to prevent/ treat this disease. In this project, we aim to perform some computational/ bioinformatics studies to compare different targets (various strains of COVID virus) and effect of various drugs/ ligands on these strains, so that some therapeutic drugs may be suggested for future use. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Nirmal Yadav |
| **Title of Project** | Exudate detection for diabetic retinopathy using Hybrid Neural Networks |
| **Duration** | 3-4 months |
| **No. of Students** | Max. 4 |
| **Related fields of study** | Machine learning and image processing |
| **Nature of work** | |
| **Credits** | 6 |
| **Abstract** | In this project, a combined approach of Signal transforms and Hybrid Neural Network (HNN) algorithms will introduce for detecting exudates, which is one of the signs of diabetic retinopathy disease. This approach consists of visual enhancement with basic pre-processing methods, the segmentation of the Optic Disk with the help of some transformation to ignore the optical disc (OD) regions from the image, and the HNN-based exudate detection system to automatically detect the exudates in the retinal image. |
| **Reference** | 1.Adem, K. (2017). *The diagnosis and classification of diabetic retinopathy disease based on image processing and machine learning, Gaziosmanpasa* University Doctoral thesis.<br>2.Liu, Q., Zou, B., Chen, J., Ke, W., Yue, K., Chen, Z., & Zhao, G. (2017). A location– to-segmentation strategy for automatic exudate segmentation in colour retinal fundus images. *Computerized Medical Imaging and Graphics, 55*, 78–86.<br>3.Badrinarayanan,VijayandKendall,AlexandCipolla,Roberto.(2017)"SegNet:Adeepconvolutionalencoder-decoderarchitectureforimage segmentation." *IEEE transactions on pattern analysis and machine intelligence*39 (12): 2481–2495. |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Nirmal Yadav |
| **Title of Project** | U-Net Approach to Enhanced Tumor Segmentation for MR brain images |
| **Duration** | 3-4 months |
| **No. of Students** | Max. 4 students |
| **Related fields of study** | Image Processing, Signal Processing |
| **Nature of work** | |
| **Credits** | 6 |
| **Abstract** | Automation in medical industry has become one of the necessities in today's medical scenario. Radiologists/physicians need such automation techniques for accurate diagnosis and treatment planning. Automatic segmentation of tumor portion from Magnetic Resonance (MR) brain images is a challenging task. In this work, deep learning-based approach is proposed for brain tumor image segmentation. The proposed method includes the concept of Wavelet Transform (WT) and Deep learning method. The significant objective of this work is to enhance the accuracy of the conventional system. In this project, the methodology is as follows, firstly the input image is pre-processed before the actual segmentation using some filters. In the second stage, skull striping is performed using traversal graph method. After finding the ROI, feature extraction is performed using Wavelet Method. After this stage U-Net is used to train and classify the normal and abnormal data. |
| **Reference** | L. Guo, L. Zhao, Y. Wu, Y. Li, G. Xu, Q. Yan, Tumor detection in MR images using one-class immune feature weighted SVMs, IEEE Trans. Magn. 47 (10) (2011) 3849–3852.<br>L. Singh, G. Chetty, D. Sharma, A novel machine learning approach for detecting the brain abnormalities from mri structural images, in: IAPR International Conference on Pattern Recognition in Bioinformatics, Springer, Berlin, Heidelberg, 2012, November, pp. 94–105.<br>R. Kumari, SVM Classification an approach on detecting abnormality in brain MRI images, Int. J. Eng. Res. Appl. 3 (4) (2013) 1686–1690. |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Prof. Pankaj Tyagi |
| **Title of Project** | Design a mobile app for CIC |
| **Duration** | Two Month (or as per semester requirement) |
| **No. of Students** | 2 to 4 |
| **Related fields of study** | Prior Knowledge of designing mobile app to the student is necessary |
| **Nature of work** | Application of IT knowledge for practical use |
| **Credits** | As per syllabus |
| **Abstract** | This app shall help student in getting/keeping the documents necessary to him/her like:<br>Details of classmates<br>Time Table,<br>Internal assessment marks,<br>Marksheet,<br>Degree,<br>Etc.<br><br>Or<br>Any idea on which student want to work, I am ready to mentor. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Swati Arora & Dr. Harendra Pal Singh |
| **Title of Project** | Energy Consumption Prediction Model |
| **Duration** | 6 Months |
| **No. of Students** | 3-4 |
| **Related fields of study** | Interdisciplinary |
| **Nature of work** | Theoretical and Simulation/Experimental |
| **Credits** | 4 |
| **Abstract** | Energy consumption prediction has always been a major need to predict and analyze the use of energy on a daily basis. By creating prediction models, we can study the different ways in which energy could be saved and how efficiently we can manage energy consumption. But in the preliminary study, most of the models are not accurate due to diverse factors that go on with energy consumption. In this project, our aim to study in depth the different possibilities and different factors of energy consumption and try to create prediction models. Our goal is to achieve utmost stability in our model for the best prediction possible |
| **Reference** | 1. https://www.sciencedirect.com/science/article/pii/S266616592030034X<br>2. http://sciencedirect.com/science/article/pii/S0743731518308773 |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Swati Arora & Dr. Harendra Pal Singh |
| **Title of Project** | Dust mitigation using nano-coating and an automated mechanical vibrator |
| **Duration** | 6 Months |
| **No. of Students** | 3-4 |
| **Related fields of study** | Interdisciplinary |
| **Nature of work** | Theoretical and Simulation/Experimental |
| **Credits** | 4 |
| **Abstract** | Dust particles and smog accumulation influence the performance on PV module. The objective of this project is to study and investigate theoretically the influence of dust mitigation on PV panels. Measures like nano-coating and automated mechanical vibrator can be used to study the effective technique in cleaning solar panels and improve the performance of the system. |
| **Reference** | 1. https://www.nature.com/articles/s41378-020-00197-z<br>2. https://link.springer.com/article/10.1186/s40984-015-0006-7 |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Swati Arora & Dr. Harendra Pal Singh |
| **Title of Project** | Performance and cost analysis of photovoltaic thermal system (PVT) |
| **Duration** | 6 Months |
| **No. of Students** | 3-4 |
| **Related fields of study** | Interdisciplinary |
| **Nature of work** | Theoretical and Simulation/Experimental |
| **Credits** | 4 |
| **Abstract** | In this project, we propose to study the performance and cost analysis of photovoltaic thermal system (PVT). Various structures including compound parabolic concentrator (CPC), integrated solar still with SPV module, passive condenser coupled with heat exchanger will be studied. Influence of nano-particles will be also analytically looked into using thermal modeling. |
| **Reference** | [1] Hassan E. S. Fath, Samy M. Elsherbiny, Effect of adding a passive condenser on solar still performance, Energy Convers. Manage. 34 (1993) 63–72.<br>[2] Lovedeep Sahota , Vineet Saini, V.K Jain, G.N. Tiwari, Performance and cost analysis of a modified built-in-passive condenser and semitransparent photovoltaic module integrated passive solar distillation system, Journal of Energy Storage, Elsevier, 2352-152 (2019). |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dorje Dawa |
| **Title of Project** | Air Pollution & Urban population susceptibility assessment to Covid-19 in India. |
| **Duration** | 3 months |
| **No. of Students** | 4 |
| **Related fields of study** | Mapping and |
| **Nature of work** | Data collection and Analysis to see the correlation with Air pollution to covid-19 cases and deaths. |
| **Credits** | 6 |
| **Abstract** | The novel human coronavirus disease 2019 (COVID-19) pandemic has claimed more than 2000,000 lives worldwide, causing tremendous public health, social, and economic damages. Although the risk factors of COVID-19 are still under investigation, environmental factors, such as urban air pollution, may play an important role in increasing population susceptibility to COVID-19 pathogenesis. |
| **Reference** | Liang, Donghai, et al. "Urban Air Pollution May Enhance COVID-19 Case-Fatality and Mortality Rates in the United States." medRxiv (2020). |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Sachin Kumar |
| **Title of Project** | Analysis of Digital Information Diffusion and Discourse |
| **Duration** | 4 Months |
| **No. of Students** | 3 |
| **Related fields of study** | Social Media, Social Computing |
| **Nature of work** | Advanced-Data Analytics and Data Science |
| **Credits** | 6 |
| **Abstract** | Present-day digital information dissemination platforms such as Twitter, Facebook, Linked In and others have taken centre stage in the media space. They are now the centre of advertising agencies as with the advanced Artificial Intelligence and target identification models provide probably more accurate audiences to the advertisers on their platforms. People also spent a lot of time on these digital information platforms for information sharing. In the present time, there is a need to have an analysis of the impact and penetration of information diffusion of such platforms in our society and its several sections. This work will deeply analyze the information consuming lifestyle of different sections of society and their priorities and expectations from information through these digitals platforms and their decision making and their impact on their lifestyle. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Sachin Kumar |
| **Title of Project** | A Study on Student's Abilities and their Choices about Career and Life. |
| **Duration** | 4 Months |
| **No. of Students** | 4 |
| **Related fields of study** | Advanced-Data Analysis, Psychology and Education |
| **Nature of work** | Advanced-Data Analytics and Data Science |
| **Credits** | 6 |
| **Abstract** | In this fast-moving world driven by the digital revolution, it has become very confusing and frustrating for the students to take a call for their life and career choices due to the involvements of many conflicting situations and parameters. There are many questions to be addressed. For instance, what to make the foundation of decision? Parents suggestion? Personal talent? Societal pressure? Peers suggested choices? or information obtained through social and digital platforms? in such situation, there are many parameters. How to decide and prioritise any parameter? There is a need to conduct such a study to get deep insights into present-day circumstances to help them in better handling of career and life situations. This work will present the deeply analysed insights and recommendations for students facing mentioned challenges about their choices for career and life. |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Ms. Shobha Rai |
| **Title of Project** | Design a video chat app for a deaf and dumb person to communicate with normal people |
| **Duration** | 3-4 months |
| **No. of Students** | Max. 4 students |
| **Related fields of study** | Android development, Deep learning |
| **Nature of work** | |
| **Credits** | 6 |
| **Abstract** | This app shall enable deaf and dumb people to communicate with hearing people by translating sign language into non-sign user language and vice-versa.<br><br>or<br><br>Any idea of student choice |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Mr. Anjani Kumar |
| **Title of Project** | Study of cyber fraud in India due to technological advancement |
| **Duration** | 3 to 4 months |
| **No. of Students** | 4 |
| **Related fields of study** | Cyber security |
| **Nature of work** | Research and development |
| **Credits** | 4 |
| **Abstract** | . The more sophisticated the technology, the higher the level of criminal activity. Before there was digital data, the world only had physical threats. However, the emergence of the internet and the global network creates cybercrime everywhere. The emergence of this crime is because many companies or organizations are involved in the internet network. Cybercrime affects technology and finances a lot in the present. Many individuals, companies or banks suffer huge losses. The study will impact the major area of crime in the different place of India. |
| **Reference** | Nasution, Muhammad & Siahaan, Andysah Putera Utama & Rossanty, Yossie & Lubis, Solly. (2018). The Phenomenon of Cyber-Crime and Fraud Victimization in Online Shop. International Journal of Civil Engineering and Technology. |

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## Project Offer

## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Sonam Tanwar |
| **Title of Project** | Heat transfer analysis in biological systems using ANSYS simulations |
| **Duration** | 4 months |
| **No. of Students** | 4 |
| **Related fields of study** | Mathematical modelling, Numerical methods |
| **Nature of work** | ANSYS simulations, Programming |
| **Credits** | 4 |
| **Abstract** | This project aims to numerically simulate the process of bio-heat transfer in living tissues using ANSYS simulations. The popular Pennes's equations governs this phenomenon of heat transfer and has a wide range of application in different medical fields such as cryobiology, hyperthermic biology etc.The existing standard module of ANSYS may not be able to simulate it properly and some user defined functions (UDF's) need to be included for accurate simulation. Obtained numerical simulations may provide useful insight to the physician during the course of treatment. |
| **Reference** | 1. https://bioheat.umbc.edu/files/2015/07/Chapter2_2007.pdf<br>2. http://users.ece.utexas.edu/~valvano/research/BioheatTransfer2005.pdf |

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## Project Offer

## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Sonam Tanwar |
| **Title of Project** | Mathematical modelling for diffusion and control of Covid 19 pandemic in India |
| **Duration** | 4 months |
| **No. of Students** | 4 |
| **Related fields of study** | Mathematical modelling, Differential equations |
| **Nature of work** | Theoretical, Programming |
| **Credits** | 6 |
| **Abstract** | This study aims to develop and simulate a mathematical model for spread and control of Covid-19 in India. We plan to study the transmission mechanism of the disease using a deterministic compartmental model, dividing the total population into mutually exclusive compartments based on their disease status. The model fitting and parameter estimation may be done with available dataset. |
| **Reference** | 1. https://link.springer.com/article/10.1007/s11071-020-05958-z<br>2. https://www.sciencedirect.com/science/article/pii/S2468042720300397<br>3. https://www.nature.com/articles/s41598-020-76710-1 |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Swati Sharma |
| **Title of Project** | Study of EG:W Based Nanofluids in a Square Cavity |
| **Duration** | 5 months |
| **No. of Students** | 2 |
| **Related fields of study** | Numerical Methods, Fluid Dynamics, Computer Programming |
| **Nature of work** | Mathematical Computation |
| **Credits** | 4 |
| **Abstract** | Numerical analysis will be done for EG:W based nanofluids in a square cavity filled with nanofluids. The nanoparticle material will be selected as $Al_2O_3$ and CuO. The governing unsteady Navier-Stokes equations will be solved numerically through a finite volume method on a staggered grid system using QUICK scheme for convective terms. The resulting equations will then be solved by an implicit, time-marching, pressure correction-based SIMPLE algorithm. |
| **Reference** | Ben-Cheikh, Nader, et al. "Natural convection of water-based nanofluids in a square enclosure with non-uniform heating of the bottom wall." (2013). |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Dr. Swati Sharma |
| **Title of Project** | Fluid Flow Past a Heated Square Cylinder |
| **Duration** | 5 months |
| **No. of Students** | 4 |
| **Related fields of study** | Numerical Methods, Fluid Dynamics, Computer Programming |
| **Nature of work** | Computational work |
| **Credits** | 4 |
| **Abstract** | Flow past a square heated cylinder near a moving wall under the incidence of uniform flow will be studied. Heat transfer performance of the nanofluids will be studied here by varying the parameters governing the fluid flow and governing the nanofluids. Attention will be paid towards the quantitative difference of hydrodynamic and heat transfer characteristics of cylinder between the clear fluid and nanofluid. |
| **Reference** | Maiti, Dilip K., and Swati Sharma. "Roles of Nanofluids, Temperature of Base Fluids, and Pressure Gradient on Heat Transfer Enhancement From a Cylinder: Uniformly Heated/Heat Flux." *Journal of Heat Transfer* 141.6 (2019).<br><br>Sharma, Swati, et al. "Nanofluid (H 2 O-Al 2 O 3/CuO) flow over a heated square cylinder near a wall under the incident of Couette flow." *Journal of Mechanical Science and Technology* 32.2 (2018): 659-670. |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

| | |
|---|---|
| **Offered by** | Neeraj Kohli |
| **Title of Project** | Climate Informatics Using Machine Learning |
| **Duration** | 6 months |
| **No. of Students** | 3-4 |
| **Related fields of study** | Climate change, Machine Learning |
| **Nature of work** | |
| **Credits** | |
| **Abstract** | Climate change is one of the biggest challenge ever faced by humanity. In this project we explore ways in which machine learning can help overcome this change . |
| **Reference** | |

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## Project Offer
## B. Tech./B.S. Innovation with Mathematics & IT

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|---|---|
| **Offered by** | Management by Sandeep Dubey |
| **Title of Project** | Future of recruitment post covid-19<br>Future of t&d post covid-19<br>Strategies will be influenced post covid-19 w.r.t covid |
| **Duration** | |
| **No. of Students** | Depends |
| **Related fields of study** | |
| **Nature of work** | |
| **Credits** | |
| **Abstract** | . |
| **Reference** | |