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UMT RESEARCH OUTLOOK

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University of Management and Technology

C-II, Johar Town, Lahore, Pakistan

Tel: +92 42 111 300 200

UMT Research Outlook

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Compiled by:
Sehrish Shoukat

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TABLE OF CONTENTS

School of Science (SSC)
Department of Mathematics

1. **Riaz, M. B., Ur Rehman, A., Wojciechowski, A., & Atangana, A. (2023). Heat and mass flux analysis of magneto-free-convection flow of Oldroyd-B fluid through porous layered inclined plate. *Scientific Reports*, 13(1), 1-15. doi10.1038/s41598-022-27265-w, Mohammad Bilal Riaz, Aziz Ur Rehman (Mathematics\SSC) Date of Publications: January 2023 HJRS: W (Platinum)**
   The present work examines the analytical solutions of the double duffusive magneto free convective flow of Oldroyd-B fluid model of an inclined plate saturated in a porous media, either fixed or moving oscillated with existence of slanted externally magnetic field. The phenomenon has been expressed in terms of partial differential equations, then transformed the governing equations in non-dimensional form. On the fluid velocity, the influence of different angles that plate make with vertical is studied as well as slanted angles of the electro magnetic lines with the porous layered inclined plate are also discussed, associated with thermal conductivity and constant concentration. For seeking exact solutions in terms of special functions namely Mittag Leffler functions, G-function etc., for Oldroyd-B fluid velocity, concentration and Oldroyd-B fluid temperature, Laplace integral transformation method is used to solve the non-dimensional model. The contribution of different velocity components are considered as thermal, mass and mechanical, and analyse the impacts of these components on the fluid dynamics. For several physical significance of various fluidic parameters on Oldroyd-B fluid velocity, concentration and Oldroyd-B fluid temperature distributions are demonstrated through various graphs. Furthermore, for being validated the acquired solutions, some limiting models such as Newtonian fluid in the absence of different fluidic parameters. Moreover, the graphical representations of the analytical solutions illustrated the main results of the present work and studied various cases regarding the movement of plate.
   https://www.nature.com/articles/s41598-022-27265-w

2. **Asjad, M. I., Inc, M., Faridi, W. A., Bakar, M. A., Muhammad, T., & Rezazadeh, H. (2023). Optical solitonic structures with singular and non-singular kernel for nonlinear fractional model in quantum mechanics. *Optical and Quantum Electronics,* 55(3), 1-20. doi :10.1007/s11082-022-04488-9. Muhammad Imran Asjad, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
   The present study examines the nonlinear time-fractional model in the sense of a solitonic structure. A non-linear Schrödinger equation has applications in light scattering, indirect optical pulses as well as planer waves and to Bose-Einstein condensates enclosed in an anisotropic-shaped cigar, in a mean-field state, etc. A new extended direct algebraic method is utilized to get the soliton solutions with modified M-truncated and Atangana–Baleanu fractional operators which have Mittag-Leffler kernel. The obtained solutions contain new families of functions such as trigonometric, hyperbolic, rational, and exponential functions. The graphical 2D, 3D, contour, and also 3D spherical presentation pictorial the analysis with the feasible parametric values. On the evidence of the acquired solutions, it can be presumed that this technique is more effective and generalized to obtain solutions of many other non-linear partial differential equations that appear in different scientific disciplines.
   https://doi.org/10.1007/s11082-022-04488-9

3. **Asjad, M. I., Faridi, W. A., Alhazmi, S. E., & Hussanan, A. (2023). The modulation instability analysis and generalized fractional propagating patterns of the Peyrard–Bishop DNA dynamical equation. *Optical and Quantum Electronics*, 55(3), 1-34. doi: 0.1007/s11082-022-04477-y. Muhammad Imran Asjad, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
   This research examines the fractional Peyrard–Bishop DNA dynamical governing system, which displays the proliferation of optical pulses in field of plasma and the optical fibre. The analytical method is utilized to find travelling wave solutions because the inverse scattering transform cannot solve the Cauchy problem for this equation. The Φ6Φ6-model expansion method is an efficient and dependable technique for generating the generalised solitonic wave profiles with a wide range of soliton families. The main advantage of the offered analytical strategy is that it specifies a constraint for each solution to guarantee its existence. As a result, solitonic wave structures get attributes such as the Jacobi elliptic function, periodicity, brightness, dark-brightness, singularity, exponential, trigonometry, and rational solitonic structures, among others, under existence conditions that have not been explored previously. The results are represented graphically in 2-D, 3-D, and contour glimpses to illustrate the behavioural responses to pulse propagation by inferring the fitting values of system parameters. The stabilty of the considered model is discussed and develope the stability condition. The fractional parameter is responsible for reducing singularity and continuing to increase the smoothness in wave patterns. It is easy to employ the Φ6Φ6-model expansion method to other complicated non-linear systems and acquire solitary waves pattern.

https://link.springer.com/article/10.1007/s11082-022-04477-y

4. **Farman, M., Jamil, S., Riaz, M. B., Azeem, M., & Saleem, M. U. (2023). Numerical and quantitative analysis of HIV/AIDS model with modified Atangana-Baleanu in Caputo sense derivative. *Alexandria Engineering Journal,* 66, 31-42. doi: 10.1016/j.aej.2022.11.034. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Silver)**

Fractional calculus plays an important role in the development of control strategies, the study of the dynamical transmission of diseases, and some other real-life problems nowadays. The time-fractional HIV/AIDS model is examined using a novel method in this paper. Based on the Atangana-concept Baleanu's of a derivative in the Caputo sense, the current modified fractional derivative operator uses singular and non-local kernels. This new modified fractional operator is given a numerical approximation and applied to the HIV/AIDS model. In the presence of this novel operator, we present some significant analysis for the HIV/AIDS epidemic model. The uniqueness and stability criteria of the model have been demonstrated using the Picard successive approximation approach and Banach's fixed point theory. The Laplace Adomian decomposition method (LADM) was used to obtain the numerical solution for the modified Atangana-Baleanu Caputo derivative model. The convergence analysis is verified for the proposed scheme. Finally, numerical results and simulations are derived with the proposed scheme for HIV/AIDS model. On the dynamics of HIV/AIDS transmission, the effects of many biological parameters are examined.
https://www.sciencedirect.com/science/article/pii/S1110016822007670

5. **Faridi, W. A., Asjad, M. I., Jhangeer, A., Yusuf, A., & Sulaiman, T. A. (2023). The weakly non-linear waves propagation for Kelvin–Helmholtz instability in the magnetohydrodynamics flow impelled by fractional theory. *Optical and Quantum Electronics*, *55*(2), 172. doi:10.1007/s11082-022-04410-3. Waqas Ali Faridi, Muhammad Ali Asjad (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**

The weakly nonlinear wave propagation that occurs in the presence of magnetic fields, in which energy is concentrated in a narrow band of wave-numbers in a dispersive and dissipative fluid. The main objective of this paper is to analyze the (2 + 1) - dimensional elliptic nonlinear Schrodinger equation under the influence of three different fractional operators. The generalized fractional soliton solutions and propagation of magnetohydrodynamics fluid in sort of solition will be visualized. The Conformable, β and M-truncated fractional operator applied to classical evolution Schrodinger equation. In order to get the analytical closed form solution, one of the generalized approach new extended direct algebraic method is utilized. The fractional nonlinear elliptic Schrodinger equation is developed in three different fractional sense. The similarity transformation technique converted the controlling fractional system to ordinary differential equations. The fractional analytical solutions such as, plane solution, mixed hyperbolic solution, periodic and mixed periodic solutions, mixed trigonometric solution, trigonometric solution, shock solution, mixed shock singular solution, mixed singular solution, complex solitary shock solution, singular solution and shock wave solutions are obtained. The graphical 2-D and 3-D representation of the results is shown to express the propagation of fluid with the magnetic field by assuming the appropriate values of the involved parameters. The graphical performance of the obtained solution at various settings of parametric values and fractional order reveals new perspectives and fascinating model phenomena. The attained outcomes have significant applications and have opened up innovative development areas for research across numerous scientific fields.
https://link.springer.com/article/10.1007/s11082-022-04410-3

6. **Saeed, M., Ahsan, M., Saeed, M. H., Rahman, A. U., Mohammed, M. A., Nedoma, J., & Martinek, R. (2023). An algebraic modeling for tuberculosis disease prognosis and proposed potential treatment methods using fuzzy hypersoft mappings. *Biomedical Signal Processing and Control*, *80*, 104267. doi: 10.1016/j.bspc.2022.104267. Muhammad Saeed, Muhammad Ahsan, Atique-ur-Rehman (Mathematics/SSC), Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Silver)**

This study aimed to put forward an Avant-guard mathematical model for assisting the diagnostic process of this Mycobacterium (Tuberculosis (TB) bacterium) based on a novel adaptive fuzzy like structure. It is tough to ascertain the specific type of TB from its seriousness after looking at the symptoms as they overlap with numerous other respiratory infections. This structure, i.e., the fuzzy hypersoft set (FHS), extends the fuzzy soft set used to resolve this issue. The FHS is a more generalized, flexible and reliable algebraic model which is capable of managing the shortcomings of existing fuzzy soft set-like models with the entitlement of multi argument based domain for the approximation of TB patients (alternatives) under examination. It tackles the uncertain observations of medical experts for the approximation of patients with the help of fuzzy membership grade within [0,1]. When the measurements possess sub-values, it is problematic to see refinement in the patient's progression timelines and anticipate the prescription term in a clinical appraisal. This novel fuzzy-like theory categorizes the distinct attributes

into corresponding disjoint attribute-valued sets for better interpretation. It is difficult to distinguish a single upper-respiratory infection due to the sheer number of infections that influence the lungs and associated breathing organs. This investigation involves monitoring and constructing a bridge between the presented symptoms and the treatment given to the patient. The FHS-mapping will recognize the severity of the disease and the proposition of adequate treatment for the patient. The presented structure can prove to be an excellent diagnosis aiding tool as it has infinite analysis potential with mathematical interfacing with the patient's condition with time.
https://www.sciencedirect.com/science/article/pii/S1746809422007212

7. **Ur Rehman, M. A., Kazim, M., Ahmed, N., Raza, A., Rafiq, M., Akgül, A., ... & Zakarya, M. (2023). Positivity preserving numerical method for epidemic model of hepatitis B disease dynamic with delay factor. *Alexandria Engineering Journal*, *64*, 505-515. doi: 10.1016/j.aej.2022.09.013. Muhammad Aziz ur Rehman, Muhammad Kazim (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Silver)**
This work attempts to study the numerical solution of nonlinear delayed Immunized Susceptible Latent Infected and Recovered (MSLIR) epidemic model of HBV disease. Reproduction number, equilibria and stability are discussed. Three different numerical techniques, Euler, RK-4 and the non-standard finite difference (NSFD) techniques are used for the numerical solution of the model. The proposed technique is independent of the size of the time step, while forward Euler and RK-4 depend on the size of a time step and retains all essential characteristics of the continuous MSLIR epidemic model like positivity and stability of equilibrium, while well-known forward Euler and RK-4 cannot sustain these characteristics. Therefore, the proposed (NSFD) technique becomes a more efficient and reliable numerical technique than the forward Euler and RK-4 scheme. Numerical simulations are presented for the validation of the obtained results.
https://www.sciencedirect.com/science/article/pii/S1110016822006007

8. **Ahmed, N., Akgül, A., Satti, A. M., Iqbal, Z., Raza, A., Rafiq, M., ... & Park, C. (2023). Analysis of fractional polio model with the Mittag-Leffler kernels. *Alexandria Engineering Journal*, 64, 957-967. doi: 10.1016/j.aej.2022.08.025. Zafar Iqbal (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Silver)**
This article investigates the transmission of polio-virus disease in the human population. The classical model is considered for studying fatal disease. First of all, the model is converted into the fractal fractional epidemic model. Then, the existence of the solution for the said model is ensured with the help of the fixed point theory. Points of equilibria for the model are worked out. The basic reproduction number is described and its role in the disease communication and stability of the model is examined by some standard results. Simulated graphs are also plotted to support the pre-results and claims. Lastly, the findings of the study are presented.
https://www.sciencedirect.com/science/article/pii/S1110016822005555

9. **Nazeer, M., Irfan, M., Hussain, F., Siddique, I., Khan, M. I., Guedri, K., & Galal, A. M. (2023). Analytical study of heat transfer rate of peristaltic flow in asymmetric channel with laser and magnetic effects: Remedy for autoimmune disease. *International Journal of Modern Physics B*, 37 (03), 2350025.doi: 10.1142/S021797922350025X. Muhammad Irfan, Imran Siddique (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Null)**
This paper addresses a hybrid nanoflow of Casson fluid. The theoretical formulation is derived by considering spherical and, as well as, platelet shape nanoparticles. Electro-osmotic flow (EOF) through an asymmetric channel endures the simultaneous effects of Joule heating, viscous dissipation and magnetic fields. Lubrication effects have also been taken into account to subdue the skin friction. Moreover, the contribution of thermal slip boundary conditions and laser radiation articulately devises a theoretical remedy for rheumatoid arthritis. Detailed parametric reveals the promising results for the application of spherical shape nanoparticles to curb autoimmune diseases.
https://www.worldscientific.com/doi/10.1142/S021797922350025X

10. **Siddique, I., Mehdi, K. B., Jarad, F., Elbrolosy, M. E., & Elmandouh, A. A. (2023). Novel precise solutions and bifurcation of traveling wave solutions for the nonlinear fractional (3+ 1)-dimensional WBBM equation. *International Journal of Modern Physics B*, *37* (02), 2350011. doi: 10.1142/S021797922350011X. Imran Siddique, Khush Bukht Mehdi (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Null)**
The nonlinear fractional differential equations (FDEs) are composed by mathematical modeling through nonlinear corporeal structures. The study of these kinds of models has an energetic position in different fields of applied sciences. In this study, we observe the dynamical behavior of nonlinear traveling waves for the M-fractional (3 + 1)-dimensional Wazwaz-Benjamin-Bona-Mohany (WBBM) equation. Novel exact traveling wave solutions in the form of trigonometric, hyperbolic and rational functions are derived using (1/G'), modified (G'/G2) and new extended direct algebraic methods with the help of symbolic soft computation. We guarantee that all the obtained results are

new and verified the main equation. To promote the essential propagated features, some investigated solutions are exhibited in the form of 2D and 3D graphics by passing on the precise values to the parameters under the constrain conditions, and this provides useful information about the dynamical behavior. Further, bifurcation behavior of nonlinear traveling waves of the proposed equation is studied with the help of bifurcation theory of planar dynamical systems. It is also observed that the proposed equation support the nonlinear solitary wave, periodic wave, kink and antikink waves and most important supernonlinear periodic wave.
https://www.worldscientific.com/doi/abs/10.1142/S021797922350011X

11. **Aslam, A., Rehman, A. U., Amin, N., Amman, M., Akhtar, M., Morley, N. A., ... & Arshad, M. I. (2023). To study the structural, electrical, and magnetic properties of M (M= Mg2+, Mn2+, and Cd2+) doped Cu-Ni-Co-La spinel ferrites.** ***Materials Chemistry and Physics,*** **294, 127034.doi: 10.1016/j.matchemphys.2022.127034. Muhammad Amman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
Tertiary Cu0.25Ni0.15M0.25Co0.35La0.15Fe1.85O4 (M = Mg2+, Mn2+, and Cd2+) spinel ferrites powders were prepared using the cost-effective sol-gel auto combustion route. The lattice parameters, absorption and vibrational bands, energy band gap, AC conductivity, and dielectric loss of the as-prepared ferrites were all measured. The Cd2+ doped ferrite has a minimum crystallite size (D) of 50.9 nm, which is smaller compared to Mg2+ and Mn2+ doped ferrites. Furthermore, the X-ray diffraction (XRD), as well as Fourier transform infrared radiation (FTIR) and Raman analysis confirmed the doping of Mg2+, Mn2+, and Cd2+ ions on their respective lattice sites. The resistivity of the divalent ions (Mg2+, Mn2+, and Cd2+) doped ferrites decreased in the para region and increased in the ferro region as the temperature increased. Moreover, the resistivity of the Cd2+ doped ferrite was smaller when compared to the ferrites doped with Mg2+ and Mn2+ ions. From Arrhenius plots, the minimum activation energy (Δ E) 0.8671 eV was observed for Cd2+ doped ferrites. The Cd2+ substituted ferrite also has the smallest AC conductivity and dielectric loss compared to Mg2+ and Mn2+ substituted ferrites. The coercivity and saturation magnetization were 136.41 Oe and 92.29 emu/g for the Cd2+ doped ferrite, respectively. These results suggest that the Cd2+ doped ferrite material could be used in high-frequency and high-power applications.
https://www.sciencedirect.com/science/article/pii/S0254058422013402

12. **Asjad, M. I., Usman, M., Assiri, T. A., Ali, A., & Tag-ElDin, E. M. (2023). Numerical investigation of fractional Maxwell nano-fluids between two coaxial cylinders via the finite difference approach.** ***Frontiers in Materials,*** **9, 1050767.doi: 10.3389/fmats.2022.1050767. Muhammad Imran Asjad, Arfan Ali (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
This study deals with numerical solution of momentum and heat transfer of fractional ordered Maxwell fluids within a coaxial cylinder. It is well known that the complex dynamics of flow regime can be well-described by the fractional approach. In this paper, a fractional differentiation operator (Formula presented.) of Caputo was applied for fractional modeling of magneto-hydro-dynamic (MHD) fluid. A set of appropriate transformations was applied to make the governing equations dimensionless. The finite differences were calculated by the discretization of momentum profile (Formula presented.) and heat profile (Formula presented.). The results obtained for (Formula presented.) and (Formula presented.) were plotted against different physical parameters, such as Prandtl number (Formula presented.), the square of Hartmann number (Formula presented.), thermal Grashof number (Formula presented.) thermal radiation parameter (Formula presented.), and heat source/sink parameter (Formula presented.). The results were verified by comparing data from the proposed method with MAPLE built-in command results. Subjecting the system to a strong magnetic field led to increasing (Formula presented.) and decreasing (Formula presented.). It was found that increasing (Formula presented.) increased the velocity and temperature profiles. Addition of (Formula presented.) nanoparticles to a base fluid of (Formula presented.) enhanced its heat transfer capability. Also, increasing the angular frequency of inner cylinder velocity resulted in a high velocity profile of fractional Maxell nano-fids within a coaxial region (cylinder).
https://www.frontiersin.org/articles/10.3389/fmats.2022.1050767/full

13. **Alrowaili, D. A., Farid, F., & Javaid, M. (2023). Gutman Connection Index of Graphs under Operations.** ***Symmetry,*** **15(1), 21. doi: 10.3390/sym15010021. Faiz Farid, Muhammad Javaid (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
In the modern era, mathematical modeling consisting of graph theoretic parameters or invariants applied to solve the problems existing in various disciplines of physical sciences like computer sciences, physics, and chemistry. Topological indices (TIs) are one of the graph invariants which are frequently used to identify the different physicochemical and structural properties of molecular graphs. Wiener index is the first distance-based TI that is used to compute the boiling points of the paraffine. For a graph F, the recently developed Gutman Connection (GC) index is defined on all the unordered pairs of vertices as the sum of the multiplications of the connection numbers and the distance between them. In this note, the (Formula presented.) index of the operation-based symmetric

networks called by first derived graph (Formula presented.) (subdivision graph), second derived graph (Formula presented.) (vertex-semitotal graph), third derived graph (Formula presented.) (edge-semitotal graph) and fourth derived graph (Formula presented.) (total graph) are computed in their general expressions consisting of various TIs of the parent graph F, where these operation-based symmetric graphs are obtained by applying the operations of subdivision, vertex semitotal, edge semitotal and the total on the graph F respectively.
https://www.mdpi.com/2073-8994/15/1/21

14. **Alam, K. H., Rohen, Y., & Saleem, N. (2023). Fixed Points of (α, β, F*) and (α, β, F**)-Weak Geraghty Contractions with an Application. *Symmetry,* 15(1), 243. doi: 10.3390/sym15010243. Naeem Saleem (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
This study aims to provide some new classes of (Formula presented.) -weak Geraghty contraction and (Formula presented.) -weak Geraghty contraction, which are self-generalized contractions on any metric space. Furthermore, we find that the mappings satisfying the definition of such contractions have a unique fixed point if the underlying space is complete. In addition, we provide an application showing the uniqueness of the solution of the two-point boundary value problem.
https://www.mdpi.com/2073-8994/15/1/243

15. **Abu Bakar, M., Owyed, S., Faridi, W. A., Abd El-Rahman, M., & Sallah, M. (2023). The First Integral of the Dissipative Nonlinear Schrödinger Equation with Nucci's Direct Method and Explicit Wave Profile Formation. *Fractal and Fractional,* 7(1), 38.doi: 10.3390/fractalfract7010038. Muhammad Abu Bakar, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
The propagation of optical soliton profiles in plasma physics and atomic structures is represented by the (Formula presented.) dimensional Schrödinger dynamical equation, which is the subject of this study. New solitary wave profiles are discovered by using Nucci's scheme and a new extended direct algebraic method. The new extended direct algebraic approach provides an easy and general mechanism for covering 37 solitonic wave solutions, which roughly corresponds to all soliton families, and Nucci's direct reduction method is used to develop the first integral and the exact solution of partial differential equations. Thus, there are several new solitonic wave patterns that are obtained, including a plane solution, mixed hyperbolic solution, periodic and mixed periodic solutions, a mixed trigonometric solution, a trigonometric solution, a shock solution, a mixed shock singular solution, a mixed singular solution, a complex solitary shock solution, a singular solution, and shock wave solutions. The first integral of the considered model and the exact solution are obtained by utilizing Nucci's scheme. We present 2-D, 3-D, and contour graphics of the results obtained to illustrate the pulse propagation characteristics while taking suitable values for the parameters involved, and we observed the influence of parameters on solitary waves. It is noticed that the wave number (Formula presented.) and the soliton speed (Formula presented.) are responsible for controlling the amplitude and periodicity of the propagating wave solution.
https://www.mdpi.com/2504-3110/7/1/38

16. **Zhou, M., Saleem, N., Ali, B., Mohsin, M., & López de Hierro, A. F. R. (2023). Common Best Proximity Points and Completeness of $\mathcal{F}$– Metric Spaces. *Mathematics*, 11(2), 281.doi: 10.3390/math11020281. Naeem Saleem, Basit Ali, Misha Mohsin (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
In this paper, we introduce three classes of proximal contractions that are called the proximally (Formula presented.) dominated contractions, generalized (Formula presented.) proximal contractions and Berinde-type weak proximal contractions, and obtain common best proximity points for these proximal contractions in the setting of (Formula presented.) metric spaces. Further, we obtain the best proximity point result for generalized (Formula presented.) proximal contractions in (Formula presented.) metric spaces. As an application, fixed point and coincidence point results for these contractions are obtained. Some examples are provided to support the validity of our main results. Moreover, we obtain a completeness characterization of the (Formula presented.) metric spaces via best proximity points.
https://www.mdpi.com/2227-7390/11/2/281

17. **Shaikh, T. S., Akgül, A., Rehman, M. A. U., Ahmed, N., Iqbal, M. S., Shahid, N., ... & De la Sen, M. (2023). Analysis of a Modified System of Infectious Disease in a Closed and Convex Subset of a Function Space with Numerical Study. *Axioms,* 12(1), 79.doi: 10.3390/axioms12010079. Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
In this article, the transmission dynamical model of the deadly infectious disease named Ebola is investigated. This disease identified in the Democratic Republic of Congo (DRC) and Sudan(now South Sudan) and was identified in 1976. The novelty of the model under discussion is the inclusion of advection and diffusion in each compartmental equation. The addition of these two terms makes the model more general. Similar to a simple population dynamic

system, the prescribed model also has two equilibrium points and an important threshold, known as the basic reproductive number..The current work comprises the existence and uniqueness of the solution, the numerical analysis of the model, and finally, the graphical simulations. In the section on the existence and uniqueness of the solutions, the optimal existence is assessed in a closed and convex subset of function space. For the numerical study, a nonstandard finite difference (NSFD) scheme is adopted to approximate the solution of the continuous mathematical model. The main reason for the adoption of this technique is delineated in the form of the positivity of the state variables, which is necessary for any population model. The positivity of the applied scheme is verified by the concept of M-matrices. Since the numerical method gives a discrete system of difference equations corresponding to a continuous system, some other relevant properties are also needed to describe it. In this respect, the consistency and stability of the designed technique are corroborated by using Taylor's series expansion and Von Neumann's stability criteria, respectively. To authenticate the proposed NSFD method, two other illustrious techniques are applied for the sake of comparison. In the end, numerical simulations are also performed that show the efficiency of the prescribed technique, while the existing techniques fail to do so.
https://www.mdpi.com/2075-1680/12/1/79

18. **Zulqarnain, R. M., Ma, W. X., Eldin, S. M., Mehdi, K. B., & Faridi, W. A. (2023). New Explicit Propagating Solitary Waves Formation and Sensitive Visualization of the Dynamical System. *Fractal and Fractional,* 7(1), 71.doi: 10.3390/fractalfract7010071. Khush Bukht Mehdi, Waqas Ali Faridi. (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
This work discusses the soliton solutions for the fractional complex Ginzburg–Landau equation in Kerr law media. It is a particularly fascinating model in this context as it is a dissipative variant of the Hamiltonian nonlinear Schrödinger equation with solutions that create localized singularities in finite time. The (Formula presented.) -model technique is one of the generalized methodologies exerted on the fractional complex Ginzburg–Landau equation to find the new solitary wave profiles. As a result, solitonic wave patterns develop, including Jacobi elliptic function, periodic, dark, bright, single, dark-bright, exponential, trigonometric, and rational solitonic structures, among others. The assurance of the practicality of the solitary wave results is provided by the constraint condition corresponding to each achieved solution. The graphical 3D and contour depiction of the attained outcomes is shown to define the pulse propagation behaviors while imagining the pertinent data for the involved parameters. The sensitive analysis predicts the dependence of the considered model on initial conditions. It is a reliable and efficient technique used to generate generalized solitonic wave profiles with diverse soliton families. Furthermore, we ensure that all results are innovative and mark remarkable impacts on the prevailing solitary wave theory literature.
https://www.mdpi.com/2504-3110/7/1/71

19. **Asjad, M. I., Karim, R., Hussanan, A., Iqbal, A., & Eldin, S. M. (2023). Applications of Fractional Partial Differential Equations for MHD Casson Fluid Flow with Innovative Ternary Nanoparticles. *Processes*, *11*(1), 218.doi: 10.3390/pr11010218. Muhammad Imran Asjad, Rizwan Karim (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
This study deals with the modeling issues of the transport problem with a fractional operator. The fractional model with generalized Fourier's law is discussed for Casson fluid flow over a flat surface. The dimensionless governing model is solved with the Laplace transform method, and the different comparisons are plotted from the obtained solutions. Other features of the problem have been analyzed instead of the symmetric behavior of the properties for different values of the fractional parameter. As a result, the ternary nanoparticles approach can be used to improve the fluid properties better than hybrid and mono nanoparticles. Further, it is evident that the law-based fractional model is more accurate and efficient in fitting any experimental data instead of an artificial replacement.
https://www.mdpi.com/2227-9717/11/1/218

20. **Zahra, A., Mardan, S. A., & Noureen, I. (2023). Analysis of heat flow in the post-quasi-static approximation for gravitational collapse in five dimension. *The European Physical Journal C,* 83(1), 51.doi: 10.1140/epjc/s10052-023-11205-7. Anam Zahra, Syed Ali Mardan (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Platinum)**
In this work, a generalized framework of the post-quasistatic approximation in higher dimensional non-comoving coordinates is presented. We study the evolution of adiabatically radiating and dissipative fluid configuration in higher dimensional post-quasi-static approximation. An iterative method for describing self-gravitating spheres is developed for this purpose. Dissipation is described by free-streaming radiation and heat flux. We match the higher dimensional interior solution, in non-comoving coordinates, with the corresponding Vaidya exterior solution. The generalized form of post-quasistatic approximation leads to a system of higher dimensional surface equations. The surface equations are of significant importance in the understanding of the physical phenomenon like luminosity, Doppler shift and red-shift at the boundary surface of gravitating sources.

https://link.springer.com/article/10.1140/epjc/s10052-023-11205-7

21. **Shaikh, T. S., Akgül, A., Rehman, M. A. U., Ahmed, N., Iqbal, M. S., Shahid, N., ... & De la Sen, M. (2023). A Nonlinear Structure of a Chemical Reaction Model and Numerical Modeling with the New Aspect of Existence and Uniqueness.** ***Mathematics*****, *11*(1), 37.doi: 10.3390/math11010037. Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

In this article, a nonlinear autocatalytic chemical reaction glycolysis model with the appearance of advection and diffusion is proposed. The occurrence and unicity of the solutions in Banach spaces are investigated. The solutions to these types of models are obtained by the optimization of the closed and convex subsets of the function space. Explicit estimates of the solutions for the admissible auxiliary data are formulated. An elegant numerical scheme is designed for an autocatalytic chemical reaction model, that is, the glycolysis model. The fundamental traits of the prescribed numerical method, for instance, the positivity, consistency, stability, etc., are also verified. The authenticity of the proposed scheme is ensured by comparing it with two extensively used numerical techniques. A numerical example is presented to observe the graphical behavior of the continuous system by constructing the numerical algorithm. The comparison depicts that the projected numerical design is more productive as compared to the other two schemes, as it holds all the important properties of the continuous model.
https://www.mdpi.com/2227-7390/11/1/37

22. **Algehyne, E. A., Abd El-Rahman, M., Faridi, W. A., Asjad, M. I., & Eldin, S. M. (2023). Lie point symmetry infinitesimals, optimal system, power series solution, and modulational gain spectrum to the mathematical Noyes–Field model of nonlinear homogeneous oscillatory Belousov–Zhabotinsky reaction.** ***Results in Physics,*** **44, 106123.doi: 10.1016/j.rinp.2022.106123. Waqas Ali Faridi, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

The chemical oscillators are identified as open system that demonstrate periodic changes in the concentration of some reaction species as a result of intricate physico-chemical mechanisms which can lead to bi-stability, the occurrence of limit cycle attractors, the emergence of spiral waves and turing patterns, and finally, deterministic chaos. Objectives: The main objective of this paper is to analyze the simple Noyes–Field governing system of differential equations for the nonlinear Belousov–Zhabotinsky reaction which delineates the non-linear oscillatory behavior of chemical systems that occurs in the homogeneous media. Methodology: The Lie symmetry invariance analysis performed to extract the symmetries infinitesimal generators and the adjoint representation carried out to develop optimal system for the obtained Lie vectors. The significant power series approach applied to obtain the analytical solution. The modulation instability criteria ensured the stability of nonlinear oscillatory Belousov–Zhabotinsky reaction process. Results: The one-dimensional Lie symmetry generators algebra of the mathematical Noyes–Field governing system for oscillatory reaction is established. Furthermore, similarity reductions are carried out as well as the development of an optimal system of the sub-algebras. The similarity transformation technique converted the controlling system to ordinary differential equations and generates the large quantity of analytical traveling wave solutions. Moreover, the closed-form analytical solution for the proposed homogeneous nonlinear oscillatory chemical process is secured. The (MI) gain spectrum graphically visualized with the suitable choice of arbitrary parameters. Conclusion: The graphical performance of the Noyes–Field model solution at various settings reveals new perspectives and fascinating model phenomena. The attained outcomes have significant applications and have opened up innovative development areas for research across numerous scientific fields.
https://www.sciencedirect.com/science/article/pii/S2211379722007379

23. **Alhebshi, R. M., Ahmed, N., Baleanu, D., Fatima, U., Dayan, F., Rafiq, M., . . . Mahmoud, E. E. (2023). Modeling of Computer Virus Propagation with Fuzzy Parameters.** ***Computers, Materials and Continua,*** **74(3), 5663-5678. doi: 10.32604/cmc.2023.033319. Fazal Dayan (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

Typically, a computer has infectivity as soon as it is infected. It is a reality that no antivirus programming can identify and eliminate all kinds of viruses, suggesting that infections would persevere on the Internet. To understand the dynamics of the virus propagation in a better way, a computer virus spread model with fuzzy parameters is presented in this work. It is assumed that all infected computers do not have the same contribution to the virus transmission process and each computer has a different degree of infectivity, which depends on the quantity of virus.Considering this, the parameters β and γ being functions of the computer virus load, are considered fuzzy numbers. Using fuzzy theory helps us understand the spread of computer viruses more realistically as these parameters have fixed values in classical models. The essential features of the model, like reproduction number and equilibrium analysis, are discussed in fuzzy senses.Moreover, with fuzziness, two numerical methods, the forward Euler technique, and a nonstandard finite difference (NSFD) scheme, respectively, are developed and analyzed. In

the evidence of the numerical simulations, the proposed NSFD method preserves the main features of the dynamic system. It can be considered a reliable tool to predict such types of solutions.
https://www.techscience.com/cmc/v74n3/50905

24. **Qureshi, M. Z. A., Raza, Q., Eldin, S. M., Zafar, M., Ali, B., & Siddique, I. (2023). Thermal performance of hybrid magnetized nanofluids flow subject to joint impact of ferro oxides/CNT nanomaterials with radiative and porous factors. *Case Studies in Thermal Engineering*, *41*, 102648.doi: 10.1016/j.csite.2022.102648. Imran Siddique (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Silver)**
We discussed the thermal performance of hybrid nanofluid flow in the presence of ferroxidase and carbon nanotube nanoparticles. Furthermore, under the impact of magnetohydrodynamics and the Reynolds number, which is related to expansion and contraction phenomena. We simultaneously examine the effects of heat radiation and porosity. The suitable similarity transformation is applied and then the mathematical problem has been solved by employing the numerical shooting method. Plots of the skin friction coefficient, temperature, and Nusselt number on various non-dimensionless parameters are shown via the bottom and upper porous walls. The thickness of the nano-layer, the ionic radii, and the shape of the hybrid nanoparticles with volume fraction, have fruitful results related to industrial sciences. Hybrid nano-fluids, as opposed to conventional nano-fluids, are a good means of heat transmission. Hybrid nanoparticles contain 2 → 4% volume fractions having a significant effect on skin friction. Overall, the magnitude values of Reynolds number 1 → 4, enhance the Nusselt number. Thermal radiation in the presence of nanoparticles with hybrid nanomaterials volume fraction 1% has a fruitful impact on heat transfer rate.
https://www.sciencedirect.com/science/article/pii/S2214157X22008851

25. **Bilal, M., Ramzan, M., Siddique, I., & Sajjad, A. (2023). Magneto-micropolar nanofluid flow through the convective permeable channel using Koo–Kleinstreuer–Li model. *Journal of Magnetism and Magnetic Materials*, *565* 170288.doi: 10.1016/j.jmmm.2022.170288. Imran Siddique (Mathematics/SSC). Date of Publication: January 2023 HJRS: W (Bronze)**
The major purpose of this paper is to determine the heat and flow properties of a non-Newtonian micropolar nanofluid through a micropolar channel having porous walls in the presence of a changing magnetic field by investigating the hydrothermal behavior. One of the plates gets heated from outside through some external source, while the other, into which the cold fluid is introduced, dilate, or shrinks over time. The effect of aluminum oxide (Al2O3) nanoparticles with H2O as base fluid is studied. The KKL (Koo–Kleinstreuer–Li) model is operated to determine the influence of thermal conductivity and viscosity of the nanofluid. The unsteady Navier–Stokes equations of the problem have been simulated in terms of similarity transformation whose results are reduced to a generalized Proudman–Johnson equation, retaining the effect of wall motion with physical conditions. The mathematical results for the stream function and heat transfer characteristics are determined using the shooting technique. MATLAB software is used for the numerical operations. Graphical outcomes are discussed in detail for the several physical parameters and associated dynamic characteristics especially expansion ratio, power low index, Reynolds number, Prandtl number, angular/microrotation velocity, volume fraction, and Hartman number on the velocity and temperature distribution. As the Hartmann number rises, it is observed that the fluid's velocity reverses from the lower to higher portions of the cylinder. The microrotational velocity also gets higher for the higher Hartmann number.
https://www.sciencedirect.com/science/article/pii/S0304885322011738

26. **Arshad, S., Siddique, I., Nawaz, F., Shaheen, A., & Khurshid, H. (2023). Dynamics of a fractional order mathematical model for COVID-19 epidemic transmission. *Physica A: Statistical Mechanics and its Applications,* 609, 128383.doi: 10.1016/j.physa.2022.128383. Imran Siddique (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
To achieve the aim of immediately halting spread of COVID-19 it is essential to know the dynamic behavior of the virus of intensive level of replication. Simply analyzing experimental data to learn about this disease consumes a lot of effort and cost. Mathematical models may be able to assist in this regard. Through integrating the mathematical frameworks with the accessible disease data it will be useful and outlay to comprehend the primary components involved in the spreading of COVID-19. There are so many techniques to formulate the impact of disease on the population mathematically, including deterministic modeling, stochastic modeling or fractional order modeling etc. Fractional derivative modeling is one of the essential techniques for analyzing real-world issues and making accurate assessments of situations. In this paper, a fractional order epidemic model that represents the transmission of COVID-19 using seven compartments of population susceptible, exposed, infective, recovered, the quarantine population, recovered–exposed, and dead population is provided. The fractional order derivative is considered in the Caputo sense. In order to determine the epidemic forecast and persistence, we calculate the reproduction number R0. Applying fixed point theory, the existence and uniqueness of the solutions of fractional order derivative

have been studied. Moreover, we implement the generalized Adams–Bashforth–Moulton method to get an approximate solution of the fractional-order COVID-19 model. Finally, numerical result and an outstanding graphic simulation are presented.
https://www.sciencedirect.com/science/article/pii/S0378437122009414

27. **Faridi, W. A., Asghar, U., Asjad, M. I., Zidan, A. M., & Eldin, S. M. (2023). Explicit propagating electrostatic potential waves formation and dynamical assessment of generalized Kadomtsev–Petviashvili modified equal width-Burgers model with sensitivity and modulation instability gain spectrum visualization. *Results in Physics*, *44*, 106167.doi: 10.1016/j.rinp.2022.106167. Waqas Ali Faridi, Umair Asghar, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: January 2023 HJRS: W(Bronze)**
The major motive of this study is to analyze the nonlinear integrable model which is generalized Kadomtsev–Petviashvili modified equal width-Burgers equation. It can be utilized extensively a weakly non-linear restoring forces, dispersion, small damping and nonlinear media with dissipation to narrate the long wave propagation in chemical theory. This article allocates the partial differential equation by traveling waves transformation into an ordinary differential equation. In order to acquire the analytical propagating structures, one of the generalized techniques, new extended direct algebraic methodology utilizers. As a consequence, we establish the mixed singular solution, singular solution, mixed shock-singular solution, mixed complex solitary-shock solution, mixed periodic results, mixed trigonometric results have been derived in the formation of a mixed periodic and periodic class, the mixed hyperbolic solution, plane solution, which is derived via Mathematica. The Chaos investigation is carried out to envision the dynamical insights of ocean wave integrable model. The sensitive analysis performed to verify the perceptiveness of model regarding parameters and initial conditions. Modulational instability gain spectrum developed and envisaged with appropriate parametric values and ensured the stability of the considered model. In addition, two-dimension, three-dimension, and contour surfaces are embellished to validate the physical properties of the derived solutions. The developed electro potential soliton structures can reveal the deep atomic insights. The dynamics of physical phenomenon can be controlled by fractional parameter.
https://www.sciencedirect.com/science/article/pii/S2211379722007884

28. **Zulqarnain, R. M., Ma, W. X., Siddique, I., Hussain, S., Gurmani, F. J., & Ahamad, M. I. (2023). Extension of aggregation operators to site selection for solid waste management under neutrosophic hypersoft set. *AIMS Mathematics*, *8*(2), 4168-4201.doi: 10.3934/math.2023208. Imran Siddiqui (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
With the fast growth of the economy and rapid urbanization, the waste produced by the urban population also rises as the population increases. Due to communal, ecological, and financial constrictions, indicating a landfill site has become perplexing. Also, the choice of the landfill site is oppressed with vagueness and complexity due to the deficiency of information from experts and the existence of indeterminate data in the decision-making (DM) process. The neutrosophic hypersoft set (NHSS) is the most generalized form of the neutrosophic soft set, which deals with the multi-sub-attributes of the alternatives. The NHSS accurately judges the insufficiencies, concerns, and hesitation in the DM process compared to IFHSS and PFHSS, considering the truthiness, falsity, and indeterminacy of each sub-attribute of given parameters. This research extant the operational laws for neutrosophic hypersoft numbers (NHSNs). Furthermore, we introduce the aggregation operators (AOs) for NHSS, such as neutrosophic hypersoft weighted average (NHSWA) and neutrosophic hypersoft weighted geometric (NHSWG) operators, with their necessary properties. Also, a novel multi-criteria decision-making (MCDM) approach has been developed for site selection of solid waste management (SWM). Moreover, a numerical description is presented to confirm the reliability and usability of the proposed technique. The output of the advocated algorithm is compared with the related models already established to regulate the favorable features of the planned study.
http://www.aimspress.com/article/doi/10.3934/math.2023208

29. **Rahman, A. U., Saeed, M., Mohammed, M. A., Al-Waisy, A. S., Kadry, S., & Kim, J. (2023). An innovative fuzzy parameterized MADM approach to site selection for dam construction based on sv-complex neutrosophic hypersoft set. *AIMS Mathematics*, *8*(2), 4907-4929.doi: 10.3934/math.2023245. Atiqe ur Rehman, Muhammad Saeed (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
Dams are water reservoirs that provide adequate freshwater to residential, industrial, and mining sites. They are widely used to generate electricity, control flooding, and irrigate agricultural lands. Due to recent urbanization trends, industrialization, and climatic changes, the construction of dams is in dire need, which is planning intensive, quite expensive, and time-consuming. Moreover, finding an appropriate site to construct dams is also considered a challenging task for decision-makers. The dam site selection problem (DSSP) has already been considered a multi-criteria decision-making (MCDM) problem under uncertain (fuzzy set) environments by several researchers. However, they ignored some essential evaluating features (e.g., (a) fuzzy parameterized grades, which assess the

vague nature of parameters and sub-parameters, (b) the hypersoft setting, which provides multi-argument-based domains for the approximation of alternatives, (c) the complex setting which tackles the periodicity of data, and (d) the single-valued neutrosophic setting which facilitates the decision makers to provide their opinions in three-dimensional aspects) that can be used in DSSP to make it more reliable and trustworthy. Thus this study aims to employ a robust fuzzy parameterized algebraic approach which starts with the characterization of a novel structure "fuzzy parameterized single valued complex neutrosophic hypersoft set (˜λ-set)" that is competent to deal with the above-mentioned features jointly. After that, it integrates the concept of fuzzy parameterization, decision-makers opinions in terms of single-valued complex neutrosophic numbers, and the classical matrix theory to compute the score values for evaluating alternatives. Based on the stages of the proposed approach, an algorithm is proposed, which is further explained by an illustrative example in which DSSP is considered a multiple attributes decision-making (MADM) scenario. The computed score values are then used to evaluate some suitable sites (regions) for dam construction. The computational results of the proposed algorithm are found to be precise and consistent through their comparison with some already developed approaches.
http://www.aimspress.com/article/doi/10.3934/math.2023245

30. **Ihsan, M., Saeed, M., Rahman, A. U., Kamacı, H., & Ali, N. (2023). An MADM-based fuzzy parameterized framework for solar panels evaluation in a fuzzy hypersoft expert set environment. *Aims mathematics*, *8*(2), 3403-3427.doi: 10.3934/math.2023175. Muhammad Ihsan, Muhammad Saeed, Atiqe ur Rehman (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
The selection of parameters plays a vital role in the multi-attribute decision-making process. In some situations, it is observed that the nature of parameters is ambiguous and a multi-decisive opinion is necessary for managing such parametric uncertainty. In the literature, there is no suitable model that can cope with such situations. This study was purposed to develop a novel context called the fuzzy parameterized fuzzy hypersoft expert set (FPFHSE-set), which is capable of managing the uncertain nature of parameters and the multi-decisive opinion of experts collectively in one model. In this way, the proposed model may be described as the generalization of the existing model fuzzy parameterized fuzzy soft expert set (FPFSE-set). Theoretic, axiomatic and algorithmic approaches have been employed for the characterization of the basic notions of the FPFHSE-set. In order to handle multi-attribute decision-making, two algorithms are proposed and then validated by applying them to some real-world scenarios in the FPFHSE-set environment. The merits and superiority of the new algorithms are presented by comparing them with some existing fuzzy decision-making models. According to the proposed FPFHSE-set-based decision-making approaches, the experts have more freedom in specifying their preferences and thoughts according to their expertise, and they can process new types of data. Therefore, this paper presents a state-of-the-art improvement that provides a holistic view to understand and handle the multi-attribute decision-making issues focused on the objective of classifying alternatives according to multiple attributes by multiple experts.
https://www.aimspress.com/aimspress-data/math/2023/2/PDF/math-08-02-175.pdf

31. **Ashraf, A., Javed, F., Zhang, Z., & Fatima, G. (2023). Traversable wormholes solutions in f ($\mathcal{R}$, ϕ, χ) gravity under conformal symmetry. *International Journal of Geometric Methods in Modern Physics*, *20*(1), 2350014-412. doi: 10.1142/S0219887823500147. Ghulam Fatima (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
The present analysis deals with the wormhole (WH) solutions in f($\mathcal{R}$,ϕ,χ) gravity, where $\mathcal{R}$, χ and ϕ represent the Ricci scalar, kinetic expression and potential field, respectively. To complete this analysis, we use the WH geometry via spherical spacetime with the anisotropic matter distribution. Further, we consider the Gaussian distribution as non-commutative geometry to complete the analysis under conformal symmetry. We calculate the exact WH shape function by plugging the possible conformal Killing vectors. Further, we have discussed the embedded surface to understand the WH geometry. Furthermore, the Tolman-Oppenheimer-Volkoff equation is considered to discuss the stability of WH configuration with the Gaussian energy density source.
https://www.worldscientific.com/doi/abs/10.1142/S0219887823500147

32. **Ahmad, B., Ahmad, M. O., Farman, M., Akgül, A., & Riaz, M. B. (2023). A significance of multi slip condition for inclined MHD nano-fluid flow with non linear thermal radiations, Dufuor and Sorrot, and chemically reactive bio-convection effect. *South African Journal of Chemical Engineering*, *43*, 135-145.doi: 10.1016/j.sajce.2022.10.009. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
The aim of this research is to discuss the significance of slip conditions for magnetized nanofluid flow with the impact of nonlinear thermal radiations, activation energy, inclined MHD, sorrot and dufour, and gyrotactic micro motile organisms over continuous stretching of a two-dimensional sheet. The governing equations emerge in the form of partial differential equations. Since the resultant governing differential equations are nonlinear, the partial

differential equations are transformed into ordinary differential equations using a workable similarity transformation. By using the Bvp4c module of the MATLAB program, the simplified mathematical framework can be numerically solved. The computation of Coefficients of skin friction, Nusselt numbers, different patterns of velocity profiles, fluid temperature, and concentration profiles reveals the physical nature of this study. As compared to earlier investigations, it was found that the obtained results demonstrated high degrees of symmetry and precision. A decline observes in velocity for boosted values of MHD, inclination, and rotatory parameter. However thermal transportation increases by increasing brownien motion, thermophoresis, radiation and Sorrot effect. The study has significant application in heat control systems, food factories, thermal exchangers, biomechanics, biomedical engineering, and aero dynamical systems.
https://www.sciencedirect.com/science/article/pii/S1026918522000968

33. **Iqbal, Z., Rehman, M. A. U., Imran, M., Ahmed, N., Fatima, U., Akgül, A., . . . Jarad, F. (2023). A finite difference scheme to solve a fractional order epidemic model of computer virus. *AIMS Mathematics,* 8(1), 2337-2359. doi: 10.3934/math.2023121. Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
In this article, an analytical and numerical analysis of a computer virus epidemic model is presented. To more thoroughly examine the dynamics of the virus, the classical model is transformed into a fractional order model. The Caputo differential operator is applied to achieve this. The Jacobian approach is employed to investigate the model's stability. To investigate the model's numerical solution, a hybridized numerical scheme called the Grunwald Letnikov nonstandard finite difference (GL-NSFD) scheme is created. Some essential characteristics of the population model are scrutinized, including positivity boundedness and scheme stability. The aforementioned features are validated using test cases and computer simulations. The mathematical graphs are all detailed. It is also investigated how the fundamental reproduction number R0 functions in stability analysis and illness dynamics.
https://www.aimspress.com/article/doi/10.3934/math.2023121

34. **Javed, F., Fatima, G., Mustafa, G., & Övgün, A. (2023). Effects of variable equations of state on the stability of nonlinear electrodynamics thin-shell wormholes. *International Journal of Geometric Methods in Modern Physics,* 20(01), 2350010. doi: 10.1142/s021988782350010x. Ghulam Fatima (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
This paper explores the role of nonlinear electrodynamics on the stable configuration of thin-shell wormholes formulated from two equivalent geometries of Reissner-Nordström black hole with nonlinear electrodynamics. For this purpose, we use cut and paste approach to eliminate the central singularity and event horizons of the black hole geometry. Then, we explore the stability of the developed model by considering different types of matter distribution located at thin-shell, i.e. barotropic model and variable equations of state (phantomlike variable and Chaplygin variable models). We use linearized radial perturbation to explore the stable characteristics of thin-shell wormholes. It is interesting to mention that Schwarzschild and Reissner-Nordström black holes show the unstable configuration for such type of matter distribution while Reissner-Nordström black hole with nonlinear electrodynamics expresses stable regions. It is found that the presence of nonlinear electrodynamics gives the possibility of a stable structure for barotropic as well as variable models. It is concluded that stable region increases for these models by considering higher negative values of coupling constant α and the real constant n.
https://www.worldscientific.com/doi/epdf/10.1142/S021988782350010X

35. **Siddique, I., Khan, Y., Nadeem, M., Awrejcewicz, J., & Bilal, M. (2023). Significance of heat transfer for second-grade fuzzy hybrid nanofluid flow over a stretching/shrinking Riga wedge. *AIMS Mathematics,* 8(1), 295-316. doi: 10.3934/math.2023014. Imran Siddidue, Muhammad Nadeem (Mathematics)/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
This investigation presents the fuzzy nanoparticle volume fraction on heat transfer of second-grade hybrid Al2 O3 +Cu/EO nanofluid over a stretching/shrinking Riga wedge under the contribution of heat source, stagnation point, and nonlinear thermal radiation. Also, this inquiry includes flow simulations using modified Hartmann number, boundary wall slip and heat convective boundary condition. Engine oil is used as the host fluid and two distinct nanomaterials (Cu and Al2 O3) are used as nanoparticles. The associated nonlinear governing PDEs are intended to be reduced into ODEs using suitable transformations. After that `bvp4c,' a MATLAB technique is used to compute the solution of said problem. For validation, the current findings are consistent with those previously published. The temperature of the hybrid nanofluid rises significantly more quickly than the temperature of the second-grade fluid, for larger values of the wedge angle parameter, the volume percentage of nanomaterials. For improvements to the wedge angle and Hartmann parameter, the skin friction factor improves. Also, for the comparison of nanofluids and hybrid nanofluids through membership function (MF), the nanoparticle volume fraction is taken as a triangular fuzzy number (TFN) in this work. Membership function and σ -cut are controlled TFN

which ranges from 0 to 1. According to the fuzzy analysis, the hybrid nanofluid gives a more heat transfer rate as compared to nanofluids. Heat transfer and boundary layer flow at wedges have recently received a lot of attention due to several metallurgical and engineering physical applications such as continuous casting, metal extrusion, wire drawing, plastic, hot rolling, crystal growing, fibreglass and paper manufacturing.
http://www.aimspress.com/article/doi/10.3934/math.2023014

36. **Zahid, M., Siddique, I., & Ali, R. (2023). Coating of a viscoplastic material onto a moving porous web during forward roll coating process: A theoretical study. *Journal of Plastic Film & Sheeting,* 39(1), 19-51. doi: 10.1177/87560879221113638. Imran Siddique (Mathematics/SSC) Date of publication: January 2023 HJRS: X (Clay)**
In this paper, a mathematical model of forward roll for coating a thin viscoplastic fluid onto a moving porous web is developed when the web passes through a small gap between the two rigid rolls. The conservation equations in the light of lubrication approximation theory are non-dimensionalized and solutions for the velocity profile, flow rate, pressure distribution are calculated numerically by using Range-Kutta-Fehlberg's method. It is found that by changing (increasing/decreasing) the material parameters, one can really control the engineering quantities like velocity distribution, flow rate, pressure distribution, and penetration depth. The velocity graphs show that the gap between the velocity curves decrease, as fluid moves toward the separation point. This has a significant effect on the final volume of fluid flowing as at the separation point the fluid splits evenly. It was also found that the degree of fluid penetration is affected by the web flexibility and permeability. It has also been found that viscoelastic parameter and ratio of viscous to elastic forces have great impact on the emerging parameters, furthermore, the pressure gradient has been significantly affected with the variation in permeability and deformability. It is worth mentioning that the present study is a quick reference for the engineer working in coating industries and to compare the results with experimental data. Some results are shown graphically.
https://journals.sagepub.com/doi/abs/10.1177/87560879221113638

37. **Manzoor, R., Awais Sadiq, M., & Hussain, I. (2023). The impact of gravity on the evolution of cavity in the cluster of stars. *Classical and Quantum Gravity,* 40(6), 065007. doi: 10.1088/1361-6382/acbadb. Rubab Manzoor, M. Awais Sadiq, Imdad Hussain (Mathematics/SSC) Date of publication: February 2023 HJRS: W (Gold)**
This paper analyzes the evolution of cavities for the cluster of stars in the context of modified Gauss-Bonnet gravity. For this purpose, we assume a spherically symmetric geometry with locally anisotropic fluid distribution. It is assumed that the proper radial distance among neighboring stellar components stays unchanged during purely areal evolution stage. We provide some analytical solutions by using general formulism in f(G, T) gravitation theory. The thick-shells cavities at one or both boundary surfaces are found to satisfy the Darmois conditions. Moreover, we also investigate the physical behavior of cavity models by considering the stellar 4U1820 − 30. We conclude that the dark matter has a strong impact on the evolution of cavities in the cluster of stars.
https://iopscience.iop.org/article/10.1088/1361-6382/acbadb

38. **Manzoor, R., Sadiq, M. A., Mumtaz, S., & Kausar, H. R. (2023). Cluster of stars in f(□, T) gravity. *Physica Scripta,* 98(2), 025011. doi: 10.1088/1402-4896/acb297. Rubab Manzoor, M. Awais Sadiq (Mathematics/SSC) Date of publication: January 2023 HJRS: W (Honorable Mention)**
This paper is devoted to analyze the dynamical impacts of $f({ \mathcal G },T)$ gravity model on the cluster of stars. For this motive, we consider the spherically symmetric interior geometry with anisotropic fluid as analogous to cluster of stars distributions. We express the modified field equations by taking a particular model of $f({ \mathcal G },T)$, i.e. $f({ \mathcal G },T)=f(T)+f({ \mathcal G })$. In order to explore the evolutionary behavior of cluster of stars, the observational data of a compact star 4U1820 − 30 is used. We construct the modified scalar functions by orthogonal splitting of Riemann tensor in $f({ \mathcal G },T)$ theory of gravity and find the factors causing density irregularities in the framework. We calculate the evolution parameters by using these scalar functions. Moreover, we also investigate the structure scalars for dust ball. The dynamical effects on cluster of stars are examined via structure scalars in the presence of Gauss-Bonnet gravity. It is found that Gauss-Bonnet parameter representing exotic material in the cluster plays a vital role in governing the dynamics of cluster of stars.
https://iopscience.iop.org/article/10.1088/1402-4896/acb297/meta

39. **Manzoor, R., Ramzan, K., & Farooq, M. A. (2023). Evolution of expansion-free massive stellar object in f(R, T) gravity. *The European Physical Journal Plus,* 138(2), 134. doi: 10.1140/epjp/s13360-023-03734-7. Rubab Manzoor, Kashif Ramzan (Mathematics/SSC) Date of publication: February 2023 HJRS: W (Bronze)**
This paper explores an expansion-free model of a cluster of stars in the f(R, T) gravity. We consider a dissipative anisotropic viscous model of the star cluster. The mathematical modeling of a cluster of stars involving field equations, junction condition and dynamical equations is presented. The circumferential and relative radial

velocities of the evolving layers of fluids are used to describe the physical meaning of expansion and shear effects. It is concluded that the expansion-free evolution of the star cluster contains a vacuum cavity within it. The relative velocity between the neighboring layers of fluids determines the cluster's expansion-free and shear-free collapse. The Skripkin model with constant density is equivalent to the non-dissipative expansion-free isotropic star cluster. For the shear-free scenario, this model demonstrates homologous evolution. Finally, it is found that the f(R, T) gravitational terms indicating dark matter's contribution to a star cluster have a significant impact on the dynamics of expansion-free evolution.
https://link.springer.com/article/10.1140/epjp/s13360-023-03734-7

40. **Jawad, A., Zafar, U., Saleem, M., & Manzoor, R. (2023). Impact of exponential entropy on the thermodynamics of 4D charged Einstein-Guass-Bonnet-AdS black hole. *Physica Scripta,* 98(3), 035022. doi: 10.1088/1402-4896/acbbaa. Muhammad Saleem, Rubab Manzoor (Mathematics/SSC) Date of publication: February 2023 HJRS: W (Honorable Mention)**
In the presence of exponential corrected entropy, we investigate the thermal stability and phase transitions of a charged 4D Einstein-Gauss-Bonnet-AdS black hole by using the formalism known as the deflection angle formalism. Specifically, with the help of the elliptic function analysis, we investigate the phase structure of the black hole by focusing on the optical aspects. This has come to our attention that the thermal variation of the deflection angle can be used to generate both stable and unstable phases. The Hawking-Page phase transition, which is derived from the Gibbs free energy optical dependence, is another issue that we investigate with the help of exponentially corrected entropy. In addition, there are particular points along the deflection angle that produce a transition between large and small black holes. Our Gibbs free energy versus deflection angle behavior showed that the deflection angle can be utilized as a relevant quantity to determine the critical behavior of AdS black holes. In the presence of exponential corrected entropy, the thermodynamic geometry of a charged 4D Einstein-Guass-Bonnet-AdS black hole is also discussed.
https://iopscience.iop.org/article/10.1088/1402-4896/acbbaa/meta

41. **Faridi, W. A., Asjad, M. I., Ahmad, S., Iftene, A., Abd El-Rahman, M., & Sallah, M. (2023). Deterministic and Fractional-Order Co-Infection Model of Omicron and Delta Variants of Asymptomatic SARS-CoV-2 Carriers. *Fractal and Fractional,* 7(2), 192. Waqas Ali Faridi, Muhammad Imran Asjad (Mathematics/SSC) Date of publication: February 2023 HJRS: X (Clay)**
The Delta and Omicron variants' system was used in this research study to replicate the complex process of the SARS-CoV-2 outbreak. The generalised fractional system was designed and rigorously analysed in order to gain a comprehensive understanding of the transmission dynamics of both variants. The proposed dynamical system has heredity and memory effects, which greatly improved our ability to perceive the disease propagation dynamics. The non-singular Atangana–Baleanu fractional operator was used to forecast the current pandemic in order to meet this challenge. The Picard recursions approach can be used to ensure that the designed fractional system has at least one solution occupying the growth condition and memory function regardless of the initial conditions. The Hyers–Ulam–Rassias stability criteria were used to carry out the stability analysis of the fractional governing system of equations, and the fixed-point theory ensured the uniqueness of the solution. Additionally, the model exhibited global asymptotically stable behaviour in some conditions. The approximate behaviour of the fatal virus was investigated using an efficient and reliable fractional numerical Adams–Bashforth approach. The outcome demonstrated that there will be a significant decline in the population of those infected with the Omicron and Delta SARS-CoV-2 variants if the vaccination rate is increased (in both the symptomatic and symptomatic stages).
https://www.mdpi.com/2504-3110/7/2/192

42. **Ullah, N., Asjad, M. I., Almusawa, M. Y., & Eldin, S. M. (2023). Dynamics of Nonlinear Optics with Different Analytical Approaches. *Fractal and Fractional,* 7(2), 138. Naeem Ullah, Muhammad Imran Asjad (Mathematics/SSC) Date of publication: February 2023 HJRS: X (Clay)**
In this article, we investigate novel optical solitons solutions for the Lakshmanan–Porsezian–Daniel (LPD) equation, along with group velocity dispersion and spatio-temporal dispersion, via three altered analytical techniques. A variety of bright, singular, dark, periodic singular, and kink solitons solutions are constructed via the Kudryashov method, the generalized tanh method and the Sardar-subequation method. The dynamical behavior of the extracted solutions is demonstrated in graphical form such as 3D plots, 2D plots, and contour plots. The originality of the obtained solutions is recognized by comparison with each other and solutions previously stated in the literature for the LPD model, which displays the efficiency of the methods under consideration.
https://www.mdpi.com/2504-3110/7/2/138

43. **Rashid, I., Zubair, T., Asjad, M. I., Irshad, S., & Eldin, S. M. (2023). The MHD graphene–CMC–water nanofluid past a stretchable wall with Joule heating and velocity slip impact: Coolant application. *Frontiers in Physics,* 10. doi: 10.3389/fphy.2022.1065982. Muhammad Imran Asjad (Mathematics/SSC) Date of publication: January 2023 HJRS: W (Bronze)**

The heat transport mechanism has an engrossing application in effective heat management for the automobile industry and the biomedical industry. The analysis of the MHD graphene−carboxymethyl cellulose (CMC) solution−water nanofluid past a stretchable wall with Joule heating and velocity slip impact is performed in this regard. A graphene-based nanofluid is considered. The dynamic model is used to simplify the complicated ordinary differential equations into non-dimensional forms, which are then evaluated analytically. Numerical data and graphs are produced to analyze the consequences of a physical entity with the aid of Maple 17. Moreover, the velocity field is decreased, while the magnitude of the magnetic parameter is increased. A decrease in θ(η) is observed as a result of an increase in φ. It is noted that a rise in the magnetic parameter causes a fall in the temperature distribution. It is perceived that −f″(0) is decreased with an augmentation in βs, and an opposite trend is shown for φ. The velocity profile is the growing function of Mgn, βs, and Kve, with the reversed mode shown in case of φ. The temperature profile is the declining function of Pr, Ecrt, φ, and χ, with a contradictory trend observed for Mgn and βs. The flow regime is displayed against the viscoelastic parameter.
https://www.frontiersin.org/articles/10.3389/fphy.2022.1065982/full

44. **Majid, S. Z., Faridi, W. A., Asjad, M. I., Abd El-Rahman, M., & Eldin, S. M. (2023). Explicit Soliton Structure Formation for the Riemann Wave Equation and a Sensitive Demonstration. *Fractal and Fractional,* 7(2), 102. Sheikh Zain Majid, Waqas Ali Faridi, Muhammad Imran Asjad (Mathematics/SSC) Date of publication: February 2023 HJRS: X (Clay)**

The motive of the study was to explore the nonlinear Riemann wave equation, which describes the tsunami and tidal waves in the sea and homogeneous and stationary media. This study establishes the framework for the analytical solutions to the Riemann wave equation using the new extended direct algebraic method. As a result, the soliton patterns of the Riemann wave equation have been successfully illustrated, with exact solutions offered by the plane solution, trigonometry solution, mixed hyperbolic solution, mixed periodic and periodic solutions, shock solution, mixed singular solution, mixed trigonometric solution, mixed shock single solution, complex soliton shock solution, singular solution, and shock wave solutions. Graphical visualization is provided of the results with suitable values of the involved parameters by Mathematica. It was visualized that the velocity of the soliton and the wave number controls the behavior of the soliton. We are confident that our research will assist physicists in predicting new notions in mathematical physics.
https://www.mdpi.com/2504-3110/7/2/102

Book Chapter

1. **Rashid, T., Mahboob, A., & Beg, I. (2023). Bilevel Approach for E-Bidding Auction with Regret Theory. In L. Sahoo, T. Senapati & R. R. Yager (Eds.), *Real Life Applications of Multiple Criteria Decision Making Techniques in Fuzzy Domain* (pp. 319-332). Singapore: Springer Nature Singapore. Tabasam Rashid, Aamir Mahboob (Mathematics/SSC) Date of Publication: 2023**

In e-price bid auctions, we construct an auction model using regret decision theory to explain how a bidder decides his bidding price. The fundamental distinction between regret theory and other decision theories under uncertainty is clarified in this article. The suggested regret decision theory is scenario-based rather than the other theories. The process of the suggested theory is split into two stages. The first stage is to consider every possible lowest bidding offered by the auctioneers and select the one action point from the bidding price. After selecting the action point in the second stage, a decision-maker evaluates the best bidding price that produces the best results for him. Our model captures the various preferences for risk in such auction issues, which are considerably different from the typical auction model based on probability distribution in which maximizing expected utility is the aim. The study results indicate that the suggested decision models should give valuable framework for understanding the different behaviors of decision makers and assist the decision maker in finding the optimal solution according to his attitude regarding partly known information.
https://link.springer.com/chapter/10.1007/978-981-19-4929-6_15

Conference Proceeding

1. **Osalusi, O. J., Zafar, A. A., Asgir, M., Baleanu, D., & Riaz, M. B. (2023) Case Study of Non-singular Kernel Model for MHD Boundary Layer Flow of a Rate Type Fluid over an Oscillating Plate. Vol. 415. *4th International Conference on Mathematical Modelling, Applied Analysis and Computation, ICMMAAC 2021* (pp. 91-106). Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: 2023**
   The magnetohydrodynamics boundary layer flow of rate type fluid over an oscillating inclined infinite plate along with Newtonian heating and slip at the boundary is investigated. The model is developed by using the Atangana-Baleanu time-fractional derivative operator. Temperature and velocity fields for the non-integer order derivative model are computed. From our general results, several results from the literature could be recovered, for example; the cases corresponding to the constant motion of the plate, as well as the analogous results for ordinary Maxwell fluid, the fractional viscous and ordinary viscous fluid could be recovered. Moreover, the physical significance of the parameters like relaxation time, fractional order parameter, Grashof number, and inclination of the plate is discussed and their control on the velocity of the fluid is analysed through graphical illustrations and useful conclusions are recorded.
   https://link.springer.com/chapter/10.1007/978-981-19-0179-9_4

Department of Chemistry

1) **Arif, M. (2023). Extraction of iron (III) ions by core-shell microgel for in situ formation of iron nanoparticles to reduce harmful pollutants from water. *Journal of Environmental Chemical Engineering,* 11(1), 109270. doi: https://doi.org/10.1016/j.jece.2023.109270. Muhammad Arif (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Gold)**
   Since the most transition metal ions and organic dyes are hazardous, it is crucial to remove them from water. For this purpose, various systems are reported for removal of only transition metal ions or organic dyes. I have introduced a new system which is suitable for removal of both metal ions and organic dyes. The free radical precipitation polymerization method was used to create the spherical system of silica surrounded by poly(N-vinylcaprolactam-acrylic acid) S@P(NVCP-AA) core shell microgels and then characterized by using FTIR, DLS, XRD, and STEM. The S@P(NVCP-AA) microgel system was applied as adsorbent to extract iron (III) ions from water under various concentrations of S@P(NVCP-AA), iron (III) ions content, pH, and agitation time. The adsorption process of iron (III) ions on S@P(NVCP-AA) microgels was investigated by different adsorption isotherms. The kinetics of adsorption of iron (III) ions on S@P(NVCP-AA) microgel system was also examined by intra-particle diffusion model (InPDM), pseudo-1st order (P1O), pseudo-2nd order (P2O) and Elovich model (EM). Iron nanoparticles were formed by in-situ reduction of iron (III) ions that had been adsorbed in the P(NVCP-AA) shell region of the S@P(NVCP-AA) microgel. The organic pollutants and toxic transition metal ions like 4-nitrophenol (4NiP), methyl red (MeR), methylene blue (MeB) and chromium (VI) ions (CMI) were reduced from an aqueous medium by using the iron nanoparticles loaded in S@P(NVCP-AA) microgels. The pseudo 1st order rate constant values for the catalytic reduction of 4NiP, MeR, MeB and CMI were found to be 0.778 min-1, 0.928 min-1, 0.943 min-1 and 0.142 min-1 respectively. The resulting S@Fe-P(NVCP-AA) system can act as an efficient catalyst for a wide range of additional organic transformations.
   https://www.sciencedirect.com/science/article/pii/S221334372300009X

2) **Ehsan, M., Razzaq, H., Razzaque, S., Kanwal, M., & Hussain, I. (2023). Engineering nanocomposite membranes of sodium alginate-graphene oxide for efficient separation of oil-water and antifouling performance. *Journal of Environmental Chemical Engineering*, *11*(1), 109185.doi: 10.1016/j.jece.2022.109185. Shumaila Razzaque (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Gold)**
   The consistent oil spill incidents and industrial wastewater disposal impart an adverse impact on human health and nature. The utilization of porous membranes to address these problems has been predominantly investigated. Recently, hydrophilic membranes, have revealed the promising potential in oil-water separation. Thus, the present work focuses on the fabrication of hydrophilic nanocomposite membranes by incorporating the graphene oxide (GO) nanosheets to develop cost-effective, environmentally friendly and sustainable membranes of sodium alginate (SA) for separating oil/water mixtures. The pristine sodium alginate (pSA) and composite membranes (SA-GO) were developed by solution casting and crosslinking approach. Permeation experiments confirmed that the composite membranes possess porosity, hydrophilicity and high pure water flux (PWF) in comparison to pSA membranes. The structural and morphological features of fabricated membranes were confirmed by X-ray diffractometry (XRD), Fourier transform infrared spectroscopy (FTIR), and Scanning electron microscopy (SEM). Moreover, the

thermogravimetric analysis (TGA) and tensile testing results confirmed that the composite membranes have high mechanical endurance and thermal stability over pSA membranes. In addition, the wettability and surface hydrophilicity were further assured by measuring the water contact angle. The nanocomposite membranes significantly outperformed than the pristine SA membranes in the antifouling test without the requirement for alkaline or acidic washing. These membranes were then employed for oil-water separation utilizing a pressure-driven filtration method. The separation efficiency (% S), flux recovery ratio (% FRR) and protein rejection (% R) were also evaluated for the engineered membranes. The results depict that introducing 1.5 wt% GO to the SA matrix improved oil removal efficiency by 93.26%, antifouling performance with a protein rejection rate of 90%, and the flux recovery ratio of > 88%, repeated over the three filtration cycles.
https://www.sciencedirect.com/science/article/pii/S2213343722020589

3) **Iqbal, S., Ahmed, K., Ayub, K., Butt, M. H., Saqib, A. N. S., Lakhani, A., ... & Hashmi, M. A. (2023). Transition metals incorporated on phosphorene sheet as cost-effective single atom catalysts for hydrogen evolution reaction: A DFT study. *Computational and Theoretical Chemistry*, *1220*, 113998. doi: 10.1016/j.comptc.2022.113998. Sonia Iqbal, Muhammad Hamid Butt (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Clay)**
Hydrogen is an efficient alternative for conventional energy sources with a high gravimetric caloric value and zero-emission rate. Hydrogen evolution reaction (HER) is an efficient technique for hydrogen production via water electrolysis, but the process yields limited production of hydrogen gas due to less intrinsic activity of the electrode. Pt, in this case, is known as a state-of-the-art electrocatalyst for HER reaction, however, its application is limited due to high cost and less availability. In this study, the performance of less expensive transition metals embedded on phosphorene (TM@P) has been theoretically evaluated for HER through single-atom catalysis. TM@P sheet is optimized at various spin states. Gibbs free-energy change (ΔGH*) is calculated for the system with the most stable spin states to analyze the hydrogen binding strength on the surface of the catalyst, which is a key parameter to evaluate HER activity. The results showed that low-cost TM@P could be an effective alternative to noble metals with improved catalytic activity for HER, which is also supported by NBO analysis.
https://www.sciencedirect.com/science/article/pii/S2210271X2200411X

4) **Hayat, K., Shkeel, M., Iqbal, M. A., Quah, C. K., Wong, Q. A., Nazari V, M., . . . Hameed, S. (2023). O-Halogen-substituted arene linked selenium-N-heterocyclic carbene compounds induce significant cytotoxicity: Crystal structures and molecular docking studies. *Journal of Organometallic Chemistry,* 985, 122593. doi: https://doi.org/10.1016/j.jorganchem.2022.122593. Mehwish Shkeel (Chemistry/SSC) Date of Publication: February 2023 HJRS:X (Clay)**
Synthesis of N-arylated benzimidazolium salts 1–2, as stable N-heterocyclic Carbene (NHC) σ- donor ligands, was carried out by simple, facile and high yielding method. Respective Se-NHC compounds 3–4 were synthesized in water at 100 °C in open air environment using elemental selenium as reactant. Various spectroscopic methods (FT-IR, 1H and 13C NMR) were used for characterization of the products. Single crystal of salt 2 was analyzed by x-rays crystallographic analysis. In-vitro anticancer studies of the products 1–4 were carried out against breast cancer cell line (MDA-MB-231), cervical cancer cell line from Henrietta Lacks (HeLa), human normal endothelial cell line (EA.hy926) and adenocarcinoma cell line (A549) using MTT assay and compared with a standard drug 5-Flourouracil (5FU). The products 1–4 showed IC50 values less than standard drug 5FU against MDA-MB-231. Against HeLa cell line, compound 2 and its complex 4 were more potent with IC50 value of 0.05 µM and 0.082 µM, respectively as compared with 5FU having IC50 value of 4.9 µM. Against A549 cell line the products 1–2 showed good IC50 values while 3 was inactive with very high value of IC50 and 4 also showed good IC50 value of 19.02 µM. Against EA.hy926 cell line, both the salts 1–2 showed more toxicity with lower IC50 values than selenium counterpart 3–4. The docked conformation of VEGFA, EGF, COX1 and HIF with active conformation of selenium compounds 3–4 and 5FU revealed numerous potential interactions. The selenium adducts 3–4 were better with lower binding energies than 5FU, however, both showed almost same values of inhibition constants and binding energies against all proteins. Also, inhibition constants of compounds 3–4 were almost equal but less than 5FU.
https://www.sciencedirect.com/science/article/pii/S0022328X22003412?via%3Dihub

5) **Hassan, S. U., Shafique, S., Palvasha, B. A., Saeed, M. H., Naqvi, S. A. R., Nadeem, S., Toheed. A., & Park, Y. K. (2023). Photocatalytic degradation of industrial dye using hybrid filler impregnated poly-sulfone membrane and optimizing the catalytic performance using Box-Behnkendesign. *Chemosphere*, *313*,137418. doi:10.1016/j.chemosphere.2022.137418. Sidra Shafique, Muhammad Haris Saeed, Sohail Nadeem, Toheed Akher (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Gold)**
Mixed Matrix Membranes have gained significant attention over the past few years due to their diverse applications, unique hybrid inorganic filler and polymeric properties. In this article, the impregnation of nano-hybrid filler

(polyoxometalates (~POMs) encapsulated into the metal-organic framework (MOF) ~ PMOF) on the polysulfone membrane (~PSF) was done, resulting in a mix matrix membrane (~PMOF@PSF). The developed structure was characterized by Fourier transform infrared (FT-IR), powder X-ray diffraction (PXRD), thermogravimetric analysis (TGA), scanning electron microscopy (SEM), and transmission electron microscopes (TEM). The results confirmed that the nano-hybrid filler was successfully fabricated on the surface of PSF. Different loading ratios of nano-hybrid filler (5%, 10%, 20%, 30%, and 40%) were used for impregnation. The study's objective was to enhance catalytic performance using optimization curves designed using a three-level Box-Behnken Design (BBD) simulation. The photodegradation of Methylene Blue (~MB) was studied against PMOF@PSF30% and was found to perform optimally when the concentration of catalyst, time of degradation, and temperature were 0.05–0.15 gm, 40–120 min, and 30–70 °C respectively. These experiments were replicated 15 times, and obtained results were further processed using a two-quadratic polynomial model to develop response surface methodology (RSM), which allowed for a functional relationship between the decolorization and experimental parameters. The optimal performance of the reaction mixture was calculated to be 0.15 gm for concentration, 70 °C for temperature, with an 80 min reaction time. Under these optimal conditions, the predicted decolorization of MB was 98.09%. Regression analysis with R2 > 0.99 verified the fit of experimental results with predicted values. The PMOF@PSF PSF30% demonstrated excellent reusability as its dye degradation properties were significantly unaffected after ten cycles.
https://www.sciencedirect.com/science/article/pii/S004565352203911X

6) **Maqbool, M., Akhter, T., Faheem, M., Nadeem, S., Park, C. H., & Mahmood, A. (2023). CO_2 free production of ethylene oxide via liquid phase epoxidation of ethylene using niobium oxide incorporated mesoporous silica material as the catalyst. *RSC Advances*, *13*(3), 1779-1786.doi: 10.1039/d2ra07240h. Muhammad Maqbool, Toheed Akhtar, Muhammad Faheem, Sohail Nadeem (Chemistry/ SSC) Date of publication: January 2023 HJRS: W (Bronze)**

Ethylene Oxide (EO) is an essential raw material used in various consumer products like different glycol derivatives, ethoxylates, and polymers. We hydrothermally synthesize niobium oxide incorporated with mesoporous silica material (Nb/MSM), an efficient catalyst for CO2 free-ethylene oxide (EO) production via partial oxidation of ethylene. The structural properties of Nb/MSM catalysts were characterized using XRD, TEM, and N2 adsorption-desorption. The catalytic activity of synthesized materials in liquid phase epoxidation (LPE) of ethylene was evaluated in the presence of peracetic acid (PAA) as an oxidant to avoid the production of CO2 and also minimize metal leaching. GC chromatography was used to investigate the successful production of EO, and a peak with a retention time (RT) of 9.01 min served as confirmation. Various reaction parameters viz. temperature, catalyst concentration, ethylene to PAA molar ratio, and solvent effect were investigated in order to optimize the reaction conditions for enhancing the ethylene conversion and selectivity for EO production. By this approach, the challenges of greenhouse gas production and metal leaching were addressed which were associated with previously reported catalysts.
https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07240h

7) **Ahmed, H., Kilinc, S. G., Celik, F., Kesik, H. K., Simsek, S., Ahmad, K. S., Afzal, M. S., ... & Cao, J. (2023). An Inventory of Anthelmintic Plants across the Globe. *Pathogens,* 12(1), 131. doi: 10.3390/pathogens12010131. Muhammad Sohail Afzal (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Honorable Mention)**

A wide range of novelties and significant developments in the field of veterinary science to treat helminth parasites by using natural plant products have been assessed in recent years. To the best of our knowledge, to date, there has not been such a comprehensive review of 19 years of articles on the anthelmintic potential of plants against various types of helminths in different parts of the world. Therefore, the present study reviews the available information on a large number of medicinal plants and their pharmacological effects, which may facilitate the development of an effective management strategy against helminth parasites. An electronic search in four major databases (PubMed, Scopus, Web of Science, and Google Scholar) was performed for articles published between January 2003 and April 2022. Information about plant species, local name, family, distribution, plant tissue used, and target parasite species was tabulated. All relevant studies meeting the inclusion criteria were assessed, and 118 research articles were included. In total, 259 plant species were reviewed as a potential source of anthelmintic drugs. These plants can be used as a source of natural drugs to treat helminth infections in animals, and their use would potentially reduce economic losses and improve livestock production.
https://www.mdpi.com/2076-0817/12/1/131

8) **Zahid, A., Mukhtar, Z., Qamar, M. A., Shahid, S., Ali, S. K., Shariq, M., ... & Sher, M. (2023). Synthesis of Mn-Doped ZnO Nanoparticles and Their Application in the Transesterification of Castor Oil. *Catalysts*, *13*(1), 105.doi: 10.3390/catal13010105. Afifa Zahid, Zahid Mukhtar, Muhammad Azam Qamar, Sammia Shahid, Mudassar Sher (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Bronze)**

Alarming environmental changes and the threat of natural fuel resource extinction are concerning issues in human development. This has increased scientists' efforts to phase out traditional energy resources and move on to environmentally friendly biofuels. In this study, non-edible castor oil was transesterified with methanol using a manganese-doped zinc oxide (Mn-doped ZnO) nanocatalyst. A heterogeneous nanocatalyst was prepared by means of the the sonochemical method. X-ray diffraction (XRD), energy dispersive X-ray spectroscopy (EDX), and transmission electron microscopy (TEM) were used to characterize these nanocatalysts. The transesterification reaction was studied under different temperature conditions, different ratios of methyl alcohol to castor oil, and different amounts of the catalyst to identify optimum conditions in which the maximum yield of biodiesel was produced. The maximum biodiesel yield (90.3%) was observed at 55 °C with an oil-to-methanol ratio of 1:12, and with 1.2 g of nanocatalyst. The first-order kinetic model was found to be the most suitable. Several thermodynamic parameters were also determined, such as activation energy, enthalpy, and entropy. We found that this transesterification was an endergonic and entropy-driven reaction. The results showed that the Mn-doped ZnO nanocatalyst could be a suitable catalyst for the heterogeneous catalytic transesterification process, which is essential for biodiesel production.
https://www.mdpi.com/2073-4344/13/1/105

9) **Ikhlaq, A., Fiaz, U., Rizvi, O. S., Akram, A., Qazi, U. Y., Masood, Z., ... & Javaid, R. (2023). Catalytic Ozonation Combined with Conventional Treatment Technologies for the Recycling of Automobile Service Station Wastewater. *Water*, *15*(1), 171.doi: 10.3390/w15010171. Asia Akram (Chemistry/SSC) Date of publication: January 2023 HJRS: w (Silver)**

The ample increase in water scarcity and depletion of natural resources due to their overconsumption and the contamination of water sources becomes more challenging day by day. This challenging situation has pushed the scientific community to cope with it by providing alternative solutions. Therefore, it is indeed important to conduct a sustainable study on recycling wastewater for a particular purpose. Taking this into account, an effort was made to develop a novel hybrid treatment system that applied both conventional and advanced oxidation treatment processes. In this sustainable study, an integrated system was designed for the effective treatment followed by the recycling of automobile service station wastewater (ASSWW) which comprised sedimentation (sed), catalytic ozonation, adsorption, and filtration. In the current investigation, two catalysts/adsorbents, the granular activated carbon (GAC) and rice husk (RH) were employed individually and in combination for the first time in the studied hybrid process and their performance was compared and evaluated. The obtained results revealed that the hybrid system combination-I (Sed–O3/GAC) was more efficient than combination-II (Sed–O3/RH); the maximum removal efficiency of COD was 100% and 80%, respectively. In addition, the hybrid system combination-III (Sed–O3/RH + GAC) was more economical and efficient than others by employing 35% of each absorbent in the adsorption column. Moreover, this efficient Sed–O3/RH + GAC system has a maximum removal efficiency 99%, 100%, 99%, 100%, (89%, 99%, 100%) and 100% for turbidity, COD, BOD5, fecal coliform, potentially toxic metals (Cd, Pb, As), oil and grease, respectively, at optimized conditions (O3 = 82.5 mg/L; contact time = 18 min and catalyst dose of GAC and RH = 200 g each). Furthermore, the treated water sample complied with the WWF-recommended Irrigation Water Quality Guidelines (IWQGs) for class D. The increase in biodegradability (BOD5/COD ratio) was observed from 0.41 to 0.83. Therefore, the proposed efficacious hybrid system may be employed for the recycling of ASSWW for irrigation purposes.
https://www.mdpi.com/2073-4441/15/1/171

10) **Qamar, M. A., Javed, M., Shahid, S., Shariq, M., Fadhali, M. M., Ali, S. K., & Khan, M. S. (2023). Synthesis and applications of graphitic carbon nitride (g-C3N4) based membranes for wastewater treatment: A critical review. *Heliyon*, e12685.doi: 10.1016/j.heliyon.2022.e12685. Muhammad Azam Qamar, Mohsin Javed, Sammia Shahid (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Silver)**

Semiconducting membrane combined with nanomaterials is an auspicious combination that may successfully eliminate diverse waste products from water while consuming little energy and reducing pollution. Creating an inexpensive, steady, flexible, and diversified business material for membrane production is a critical challenge in membrane technology development. Because of its unusual structure and high catalytic activity, graphitic carbon nitride (g-C3N4) has come out as a viable material for membranes. Furthermore, their great durability, high permanency under challenging environments, and long-term use without decrease in flux are significant advantages. The advanced material techniques used to manage the molecular assembly of g-C3N4 for separation membrane were detailed in this review work. The progress in using g-C3N4-based membranes for water treatment has been detailed in this presentation. The review delivers an updated description of g-C3N4 based membranes and their separation functions and new ideas for future enhancements/adjustments to address their weaknesses in real-world situations. Finally, the ongoing problems and promising future research directions for g-C3N4-based membranes are discussed.

https://www.sciencedirect.com/science/article/pii/S2405844022039731

11) **Khan, H., Shah, M. R., Barek, J., & Malik, M. I. (2023). Cancer biomarkers and their biosensors: A comprehensive review. *TrAC - Trends in Analytical Chemistry,* 158. doi: 10.1016/j.trac.2022.116813. Humaira Khan (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Platinum)**

The article starts with a brief history of discovery of cancer biomarkers followed by statistical data on published cancer biomarkers detection strategies in the last decade to demonstrate the latest trends and the necessity to develop sensitive, cost-effective, and portable monitoring systems for these purposes to monitor wide spectrum of biomarkers. The latter part contains a short description of various optical and colorimetric detection methods while focusing more on the utilization of electrochemical detection methods and their signal amplification strategies. This part shows that the current state of knowledge is still limited and there is an ample need for biosensors that can rapidly analyze cellular modifications to identify biomarkers associated with cancer for enhancing the prognosis and therapy options. Finally, different approaches employed to overcome the limitations of existing electrochemical methods for cancer biomarker detection are critically discussed while highlighting the existing challenges and future opportunities.

https://www.sciencedirect.com/science/article/pii/S0165993622002965

12) **Tabasum, A., Razzaq, H., Razzaque, S., Bibi, A., Farooq, S., Yaqub, A., ... & Rehman, S. U. (2023). Protonated polyaniline and its derivatives as potential adsorbents for simultaneous reclamation of textile dyes and oil/water separation. *Materials Chemistry and Physics,* 293, 126913.doi: 10.1016/j.matchemphys.2022.126913. Shumaila Razzaque (Chemistry/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

Potential adsorbents hold vital importance for the removal of conventional and hazardous micropollutants from waste water. The present study reports the synthesis and characterization of polyaniline (PANI) and its two derivatives by selecting pre-substituted monomers at ring (poly 4-amino phenol; PpAP) and nitrogen atom (poly N-methyl aniline; PNMA) prior to polymerization. The synthesized polymers were characterized by FTIR, XRD, TGA, SEM, TEM, BET and UV–Vis techniques. These polymers were exploited simultaneously for the removal of textile dyes and o il/water (O/W) separation. Initially, the adsorption potential of adsorbents towards removal of methylene blue (MB) dye was investigated in batch mode study by diversifying the effective factors like contact time, initial concentration of MB dye, amount of adsorbent and pH. The maximum dye adsorption capacity was found to be 320, 311, 299 mg/g for PNMA, PpAP and PANI respectively. These results were further verified by the computational studies. Thermodynamics of adsorption studies revealed that Langmiur adsorption isotherm is best fitted whereas kinetic studies were best described by pseudo second order model. The polymers were regenerated without any significant reduction in adsorption capacity by washing simply with water and ethanol. On the other hand, FTIR analysis before and after adsorption of MB explains that a variety of interactions are involved in the adsorption of MB. Moreover, the synthesized polymers were also applied for the separation of non-polar solvents from water (oil/water separation). Interestingly, PNMA, PpAP and PANI have shown promising results towards O/W separation studies obtaining separation efficiency values of 98%, 97% and 96% respectively. Good separation efficiency of prepared polymers is attainable due to hydrophilic nature of polyanilines. Overall, this study explores the potentiality of conducting polymer adsorbents for textile waste water treatment as well as for O/W separation.

https://www.sciencedirect.com/science/article/pii/S0254058422012196

13) **Ulfat, W., Mohyuddin, A., Amjad, M., Kurniawan, T. A., Mujahid, B., Nadeem, S., . . . Arif, M. (2023). Reuse of Buffing Dust-Laden Tanning Waste Hybridized with Poly- Styrene for Fabrication of Thermal Insulation Materials. *Sustainability,* 15(3), 1958. Wajad Ulfat, Ayesha Mohyuddin, Muhammad Amjad, Sohail Nadeem, Mohsin Javed, Adnan Amjad, Sadaful Hassan, Muhammad Arif (Chemistry/SSC) Beenish Mujahid (Architecture/SAP) Date of Publication: February 2023 HJRS: W (Silver)**

Air pollution, resulting from buffing dust waste produced by local leather tanning industry, has become a critical issue for the environment and public health. To promote a circular economy through resource recovery, this work developed a thermal insulation composite using buffing dust-laden tanning waste mixed with polystyrene and a blowing agent. To prepare the samples from leather tanning waste, different proportions of buffing dust (5–20% (w/w)) were blended with polystyrene in the presence of 3% (w/w) blowing agent. The composite material was processed in double-barreled with co-twin extruder to expose it to pressure and then heated at 200 °C. Different physico-chemical properties of composite samples were determined. The prepared composite materials had a good thermal conductivity (0.033–0.029 W/m-K), strong compression (5.21–6.25 ton), density (38–20 kg/m3), and water absorption (5–7.5%), as compared to conventional constructional insulation panels. The thermal conductivity of polystyrene was reduced to 10% after the addition of buffing dust (20% w/w). The presence of a blowing agent in the composite material enhanced its volume without compromising its physico-chemical properties. Thermo-gravimetric analysis showed that the thermal stability of the composite material ranged from 200–412 °C. FTIR

analysis indicated that the composite had carbonyl and amino functional groups. The SEM images revealed the formation of voids with a decreasing homogeneity of the composite after the addition of the buffing dust waste. The EDX analysis revealed that the composite also had 62% of C and a tiny amount of Cr. This implies that the composite panels can be used for installation in buildings as thermal insulators in the construction sector. Overall, this work not only resolved the energy consumption problems during manufacturing, but it also brought positive impacts on the environment by recycling hazardous buffing dust and then reusing it as a thermal insulation material. Not only does this reduce the air pollution that results from the buffing dust waste, but this also promotes resource recovery in the framework of a circular economy.
https://www.mdpi.com/2071-1050/15/3/1958

Department of Life Science

1. **Mahmood, A., Samad, A., Shah, A. A., Wadood, A., Alkathiri, A., Alshehri, M. A., ... & Umair, M. (2023). A novel biallelic variant in the Popeye domain-containing protein 1 (POPDC1) underlies limb girdle muscle dystrophy type 25. *Clinical Genetics*, *103*(2), 219-225. doi: 10.1111/cge.14238. Muhammad Umair (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Bronze)**
POPDC1 also known as BVES, is a highly conserved transmembrane protein, important for striated muscle function and homeostasis. Pathogenic variants in the POPDC1 gene are associated limb-girdle muscular dystrophy type 25 (LGMDR25). In the present study, we performed trio-whole exome sequencing (WES) followed by Sanger sequencing on a single family having LGMD clinical features. Protein modeling of all POPDC1 missense variants (POPDC1Pro134Leu, POPDC1Ile193Ser, and POPDC1Ser201Phe) associated with LGMDR25 were performed using Molecular Dynamics (MD) simulation. We identified a homozygous missense variant (c.401C>T; p.Pro134Leu) in the POPDC1 gene. Altered 3D structure, disruptive fluctuation, less compactness, and instability were observed in all the three variants of POPDC1 protein models. In comparison, POPDC1Ser201Phe protein dynamics were more unstable than other variants. Functional study of newly identified variant would add key answers to underlying mechanisms of the disease.
https://onlinelibrary.wiley.com/doi/full/10.1111/cge.14238

2. **Hussain, N., Shabbir, R. M. K., Ahmed, H., Afzal, M. S., Ullah, S., Ali, A., ... & Cao, J. Prevalence of different tick species on livestock and associated equines and canine from different agro-ecological zones of Pakistan. *Frontier in Veterinary Sciences.* 9, 1089999. doi: 10.3389/fvets.2022.1089999. Muhammad Sohail Afzal (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Gold)**
Ticks are ectoparasites that act as vectors for transmission of various pathogens to wild and domesticated animals and pose a serious threat to human health. Because of the hot and humid conditions in different agro-ecological zones of Pakistan, ticks are abundant and parasitize a variety of animals. The aim of this study was to identify different tick species and distribution on different hosts especially livestock, such as sheep, goat, cattle, buffalo, and camel, and livestock associated canines and equines, such as horse, donkey, and dog, across different agro-ecological zones of Pakistan. The ticks samples were collected and morphologically identified at genus and species level using morphological keys under stereomicroscope. A total of 2,846 animals were examined for the tick infestation, and 408 animals were tick-infested. Eleven tick species belonging to 4 genera were identified: Hyalomma anatolicum, Hyalomma scupense, Hyalomma dromedarii, Hyalomma isaaci, Rhipicephalus microplus, Rhipicephalus haemaphysaloides, Rhipicephalus turanicus, Haemaphysalis cornupunctata, Haemaphysalis montgomeryi, Haemaphysalis bispinosa, and Ixodes kashmiricus. The overall tick prevalence was 14.3%; host-wise infestation rate was 12.2% in sheep; 12.6%, goat; 11.7%, buffalo; 11.7%, cattle; 19.6%, camel; 27.4%, donkey; 23.5%, horse; and 24.3%, dog. Tick infestation of different animals differed on the basis of the zones. Camels showed the highest tick infestation rate in zones 1 and 2 (21.4 and 26.7%, respectively), whereas donkeys showed the highest infestation rate in zones 3, 4, 6, and 7 (25, 39.3, 3.3, and 21.4%, respectively). The infestation rates of Hyalomma and Rhipicephalus were the highest in zone 2 (71.4 and 52.9%, respectively). The infestation rate of Hyalomma was the highest (47.4%) in sheep; Haemaphysalis (46.9%), goat; Rhipicephalus (69.7%), buffalo; Rhipicephalus (62.3%), cattle; Hyalomma (70%), camel; Ixodes (60.9%), donkey; Ixodes (75%), horse; and Rhipicephalus (61.1%), dog. This study showed the diversity and infestation rate of different ticks with respect to their hosts and agro-ecological zones of Pakistan. High tick burdens and infestation rates are responsible for the spread of different tick-borne infections, resulting in loss of animal productivity and posing a threat to animal and human health. Understanding different tick species and their distribution across different zones will be helpful for developing efficient control strategies against different tick born infections.
https://www.frontiersin.org/articles/10.3389/fvets.2022.1089999/full

3. **Hamid, A., Zafar, A., Latif, S., Peng, L., Wang, Y., Liaqat, I., Afzal, M. S., ... & Aftab, M. N. (2023). Enzymatic hydrolysis of low temperature alkali pretreated wheat straw using immobilized β-xylanase nanoparticles. *RSC Advances, 13*(2), 1434-1445.doi: 10.1039/d2ra07231a. Muhammad Sohail Afzal (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

A low temperature alkali (LTA) pretreatment method was used to treat wheat straw. In order to obtain good results, different factors like temperature, incubation time, NaOH concentration and solid to liquid ratio for the pretreatment process were optimized. Wheat straw is a potential biomass for the production of monomeric sugars. The objective of the current study was to observe the saccharification (%) of wheat straw with immobilized magnetic nanoparticles (MNPs). For this purpose, immobilized MNPs of purified β-xylanase enzyme was used for hydrolysis of pretreated wheat straw. Wheat straw was pretreated using the LTA method and analyzed by SEM analysis. After completion of the saccharification process, saccharification% was calculated by using a DNS method. Scanning electron micrographs revealed that the hemicellulose, cellulose and lignin were partially removed and changes in the cell wall structure of the wheat straw had caused it to become deformed, increasing the specific surface area, so more fibers of the wheat straw were exposed to the immobilized β-xylanase enzyme after alkali pretreatment. The maximum saccharification potential of wheat straw was about 20.61% obtained after pretreatment with optimized conditions of 6% NaOH, 1/10 S/L, 30 °C and 72 hours. Our results indicate the reusability of the β-xylanase enzyme immobilized magnetic nanoparticles and showed a 15% residual activity after the 11th cycle. HPLC analysis of the enzyme-hydrolyzed filtrate also revealed the presence of sugars like xylose, arabinose, xylobiose, xylotriose and xylotetrose. The time duration of the pretreatment has an important effect on thermal energy consumption for the low-temperature alkali method.
https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07231a

4. **Khan, M. S., Khan, I. M., Ahmad, S. U., Rahman, I., Khan, M. Z., Khan, M. S. Z., Abbas, Z, ... & Liu, Y. (2023). Immunoinformatics design of B and T-cell epitope-based SARS-CoV-2 peptide vaccination. *Frontiers in Immunology,* 13, 1001430. .doi: 10.3389/fimmu.2022.1001430. Zain Abbas (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Gold)**

SARS-COV-2 is a virulent respiratory virus, first identified in China (Wuhan) at the end of 2019. Scientists and researchers are trying to find any possible solution to this deadly viral disease. Different drug source agents have been identified, including western medicine, natural products, and traditional Chinese medicine. They have the potential to counteract COVID-19. This virus immediately affects the liver and causes a decrease in oxygen levels. In this study, multiple vacciome approaches were employed for designing a multi-epitope subunit vaccine for battling against SARS-COV-2. Vaccine designing, immunogenicity, allergenic, and physico-chemical assessment were performed by using the vacciome approach. The vaccine design is likely to be antigenic and produce potent interactions with ACE2 and NSP3 receptors. The developed vaccine has also been given to in-silico cloning models and immune response predictions. A total number of 12 CTL and 12 HTL antigenic epitopes were predicted from three selected covid-19 virulent proteins (spike protein, nucleocapsid protein, and membrane proteins, respectively) based on C-terminal cleavage and MHC binding scores. These predicted epitopes were amalgamated by AYY and GPGPG linkers, and a β-defensins adjuvant was inserted into the N-terminus of this vaccine. This analysis shows that the recommended vaccine can produce immune responses against SARS-COV-2. Designing and developing of the mentioned vaccine will require further experimental validation.
https://www.frontiersin.org/articles/10.3389/fimmu.2022.1001430/full

5. **Ajmal, M., Muhammad, H., Nasir, M., Shoaib, M., Malik, S. A., & Ullah, I. (2023). Haploinsufficiency of EXT1 and Heparan Sulphate Deficiency Associated with Hereditary Multiple Exostoses in a Pakistani Family. *Medicina*, *59*(1), 100.doi: 10.3390/medicina59010100. Irfan Ullah (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

Hereditary multiple exostoses (HME) is a disease characterized by cartilage-capped bony protuberances at the site of growth plates of long bones. Functional mutations in the exostosin genes (EXT1 and EXT2) are reported to affect the hedgehog signalling pathways leading to multiple enchondromatosis. However, the exact role of each EXT protein in the regulation of heparan sulphate (HS) chain elongation is still an enigma. In this study, a Pakistani family with HME is investigated to find out the genetic basis of the disease. Materials and Methods: Genotyping of eight members of the family by amplifying microsatellite markers, tightly linked to the EXT1 and EXT2 genes. Results: The study revealed linkage of the HME family to the EXT1 locus 8q24.1. Sanger sequencing identified a heterozygous deletion (c.247Cdel) in exon 1 of EXT1, segregating with the disease phenotype in the family. In silico analysis predicted a shift in the frame causing an early stop codon (p.R83GfsX52). The predicted dwarf protein constituting 134 amino acids was functionally aberrant with a complete loss of the catalytic domain at the C-terminus. Interestingly, an alternative open reading frame 3 (ORF3) caused by the frame shift is predicted to encode a protein sequence, identical to the wild type and containing the catalytic domain, but lacking the first 100 amino acids of the

wild-type EXT1 protein. Conclusion: Consequently, haploinsufficiency could be the cause of HME in the investigated family as the mutated copy of EXT1 is ineffective for EXT-1/2 complex formation. The predicted ORF3 protein could be of great significance in understanding several aspects of HME pathogenesis.
https://www.mdpi.com/1648-9144/59/1/100

6. **Ullah, I., Sattar, S., Ali, I., Farid, A., Ullah, A., Eid, R. A., ... & Ullah, I. (2023). Molecular Epidemiology of Cystic Echinococcosis in Rural Baluchistan, Pakistan: A Cross-Sectional Study. *Pathogens,* 12(1), 40. doi:10.3390/pathogens12010040. Irfan Ullah (Life Science/SSC) Date of Publication: January 2023 HJRS: X (Honorable Mention)**
Cystic echinococcosis (CE), or hydatid cyst disease (HCD), is a zoonosis of significant importance caused by the cestode of Echinococcus granulosus sensu lato (s. l.) that affects mainly nomadic populations and has substantial economic consequences. Due to the 76% rural and nomadic population, Baluchistan is a highly endemic region in Pakistan for CE; however, it has not yet been investigated for CE. For this purpose, this study was carried out to investigate the molecular epidemiology of CE in this region. In total, 23 human hydatid cyst samples were collected from tertiary health care units in Baluchistan and processed for DNA extraction, which was then followed by sequencing of the cox1 mitochondrial gene of all 23 collected samples, genotyping, and phylogenetic and haplotype analysis. Most subjects were livestock owners (39.13%) in rural settings (73.91%). Most patients (73.19%) were pet owners (dogs) and used water from open sources for drinking. The liver was the most affected organ (52.17%), followed by the lungs (17.39%). Sequence analysis based on the cox1 gene revealed that EG genotype 1 (G1) was the most prevalent (56.52%), followed by G3 (34.78%), while some samples (8.7%) were identified as the Echinococcus canadensis (G6/7) genotype. A total of five haplotypes were detected with high haplotype diversity (0.80) and low nucleotide diversity (0.033). Phylogenetic analysis revealed two diverse sub-clades, each of G1 and G3 isolates from Baluchistan, that were evolutionarily related to previously reported G1 and G3 isolates from Pakistan and China. On the other hand, the G6/7 isolates of this study were evolutionarily identical to the already reported G6/7 isolates from Pakistan, Turkey, and Kazakhstan. This study concludes that diverse G1 and G3 EG isolates are present in this part of Pakistan, while the G6/G7 genotype was reported for the first time from Baluchistan.
https://www.mdpi.com/2076-0817/12/1/40

7. **Yousuf, F. A., Azam, I., Tareen, A. K., Kazmi, K. A., Muhammad, J. S., & Iqbal, M. P. (2023). Association of the BB genotype of the ABO gene with the risk of acute myocardial infarction in hospital base study. *Pakistan Journal of Medical Sciences*, *39*(1).doi:10.12669/pjms.39.1.5905. Muhammad Pervaiz Iqbal (Life Science/SSC) Date of Publication: January-February 2023 HJRS: X (Honorable Mention)**
The ABO gene locus has been identified to be associated with myocardial infarction in patients with coronary heart disease. The primary focus of this hospital-based study was to explore the relationship of ABO blood groups and ABO genotypes with acute myocardial infarction (AMI) in Karachi, Pakistan. Methods: In a comparative cross-sectional study, an equal number of adult AMI patients and healthy controls (n=275 in each group; age range 30-70 years, both males and females) were recruited from the Aga Khan University and NICVD, Karachi, with informed consent. The blood samples were analyzed for ABO blood groups and other biomarkers. PCR followed by RFLP techniques were employed for determining the ABO genotypes. Multinomial regression was used to evaluate the association of genotypes with the risk of AMI. Results: Thirteen different combinations of ABO genotypes were observed while the O2O2 and A2A2 genotypes were not detected. No significant association based on the distribution of blood groups A, B, O and AB among AMI patients and healthy individuals was observed. The odds of AMI were 3.32 times in subjects with BB genotype as compared to subjects with OO genotypes after adjustment of age, gender, body mass index, heart rate, total cholesterol, and waist circumference [AOR (95% CI) =3.32 (1.36-8.08), p-value =0.008]. Conclusion: Our hospital-based study indicates that ABO genotype BB was significantly associated with the risk of AMI. This harmful effect of the BB genotype could have a possible relationship with AMI's development in the Pakistani population.
https://pjms.org.pk/index.php/pjms/article/view/5905

8. **Rafeeq, M. M., Umair, M., Bilal, M., Habib, A. H., Waqas, A., Sain, Z. M., ... & Ali, R. H. (2023). A novel biallelic variant further delineates PRDX3-related autosomal recessive cerebellar ataxia. *Neurogenetics*, 1-6. doi: 10.1007/s10048-022-00701-9. Muhammad Umair (Life Science/SSC) Date of Publication: January 2023 HJRS: X (Honorable Mention)**
Cerebellar ataxias (CAs) comprise a rare group of neurological disorders characterized by extensive phenotypic and genetic heterogeneity. In the last several years, our understanding of the CA etiology has increased significantly and resulted in the discoveries of numerous ataxia-associated genes. Herein, we describe a single affected individual from a consanguineous family segregating a recessive neurodevelopmental disorder. The proband showed features

such as global developmental delay, cerebellar atrophy, hypotonia, speech issues, dystonia, and profound hearing impairment. Whole-exome sequencing and Sanger sequencing revealed a biallelic nonsense variant (c.496A > T; p. Lys166*) in the exon 5 of the PRDX3 gene that segregated perfectly within the family. This is the third report that associates the PRDX3 gene variant with cerebellar ataxia. In addition, associated hearing impairment further delineates the PRDX3 associated gene phenotypes.
https://link.springer.com/article/10.1007/s10048-022-00701-9

9. **Ahmad, Z., Liaqat, R., Palander, O., Bilal, M., Zeb, S., Ahmad, F., ... & Umair, M. (2023). Genetic overview of postaxial polydactyly: updated classification.** ***Clinical Genetics*****, *103*(1), 3-15.doi: 10.1111/cge.14224. Muhammad Umair (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
Polydactyly or polydactylism, also known as a hyperdactyly, is a congenital limb defect with various morphologic phenotypes. Apart from physical and functional impairments, the presence of polydactyly is an indication of an underlying syndrome in the newborn. Usually, it follows as an autosomal dominant/recessive inheritance pattern with defects in the limb development's anteroposterior patterning. Although mutations in several genes have been associated with polydactyly; however, the exact underlying cause, pathways, and disease mechanisms are still unexplored, thus making it of multi-factorial origin. Polydactyly is divided into three subtypes; radial, ulnar, and central polydactyly. So far, 11 loci (PAPA1-PAPA11) and seven human genes have been reported to cause non-syndromic postaxial polydactyly in humans, including the ZNF141, GLI3, IQCE, GLI1, FAM92A1, KIAA0825, and DACH1. In this review, we discuss emerging evidences of clinical and molecular characterization of polydactyly types in term of the involvement of newly associated genes and loci for non-syndromic postaxial polydactyly, and how these might impact our understanding of the genetic mechanisms and molecular etiology involved in the cause of polydactyly.
https://onlinelibrary.wiley.com/doi/full/10.1111/cge.14224

10. **Awan, U. A., Farooq, N., Sarwar, A., Jehangir, H. M. S., Hashmi, M. S., Alamgir, M., Khurram, M., & Afzal, M. S., (2023). Cytogenetic abnormalities in patients with hematological malignancies in Lahore city, Pakistan.** ***Brazilian Journal of Biology*****, 83, e249911. doi: 10.1590/1519-6984.249911. Usman Ayub Awan, Muhammad Khurram, Muhammad Sohail Afzal (Life Sciences/SSC) Date of Publication: Jan-Dec 2023 HJRS: X (Null)**
Hematological and hematopoietic cells malignancies of the genes and hematopoietic cells are associated with the genetic mutation, often at the chromosomal level. The standard cytogenetic study is widely accepted as one of the main diagnostics and prognostic determinants in patients. Therefore, the current descriptive and cross-sectional study sought to determine the cytogenetic analysis of frequent hematological malignancies in Pakistan. A total of 202 peripheral bone marrow or blood samples from patients with benign and malignant hematological malignancy were taken using a conventional G-banding technique. Among enrolled patients, the mean age was 21.5 years ± 23.4, and gender-wise distribution showed a marked predominance of the male 147 (73%) population compared to the female 55 (27%). Patients in the age group (2-10 years) had the highest frequency, 48 (24%), of hematological neoplasms, followed by age (11-20 years) with 40 (20%). Normal karyotypes (46, XX/46, XY) was found in 51% (n=103) patients. Furthermore, the frequency of complex karyotype was 30 (15%), while normal was seen in 171 (85%) patients. Pre-B Acute Lymphoblastic Leukemia (Pre-B ALL) was the most prevalent malignancy of 66 (33%), followed by Chronic Myelogenous Leukemia (CML) of 41 (20%) and Acute Lymphocytic Leukemia of 29 (14%). Translocation was the most prevalent 50 (25%), followed by hypotriploidy 14 (7%) and monosomy 8 (4%) on chromosome aberration analysis. In addition, t(9:22) translocation was found to be 20 (10%) in CML, with the majority in the age group (31-40 years). This study recommends that karyotyping should be tested frequently in hematological conditions because it may provide insight into the relative chromosomal changes associated with particular malignancies.
https://www.scielo.br/j/bjb/a/tLT9M7jLG8DhMb7n854XXhB/?lang=en#

11. **Pasha, U., Nisar, H., Nisar, H., Abid, R., Ashraf, N. M., & Sadaf, S. (2023). Molecular Dynamic Simulations Unravel the Underlying Impact of Missense Mutation in Autoimmunity Gene PTPN22 on Predisposition to Rheumatoid Arthritis.** ***Journal of Interferon & Cytokine Research,*** **43(3), 1-12. doi: 10.1089/jir.2022.0216. Haseeb Nisar (Life Science/SSC) Date of Publication: March 2023 HJRS: X (Clay)**
Genetic mutations in various proteins have been implicated with increased risk or severity of rheumatoidarthritis (RA) in different population groups. In the present case–control study, we have investigated the riskassociation of single nucleotide mutations present in some of the highly reported anti-inflammatory proteinsand/or cytokines, with RA susceptibility in the Pakistani subjects. The study involves 310 ethnically anddemographically similar participants from whom blood samples were taken and processed for DNA extraction.Through extensive data mining, 5 hotspot mutations reported in 4 genes, that is, interleukin (IL)-4(-590;rs2243250),IL-10(-592; rs1800872),IL-10(-1082; rs1800896),PTPN22(C1858T; rs2476601),

andTNFAIP3(T380G; rs2230926), were selected for RA susceptibility analyses using genotyping assays. The results dem-onstrated the association of only 2 DNA variants [rs2243250 (odds ratio, OR=2.025, 95% confidence interval,CI=1.357–3.002,P=0.0005 Allelic) and rs2476601 (OR=4.25, 95% CI=1.569–11.55,P=0.004 Allelic)]with RA susceptibility in the local population. The former single nucleotide mutation was nonfunctional,whereas the latter, residing in the exonic region of a linkage-proven autoimmunity genePTPN22,was involvedin R620/W620substitution. Comparative molecular dynamic simulations and free-energy calculations revealeda radical impact on the geometry/confirmation of key functional moieties in the mutant protein leading to arather weak binding of W620variant with the interacting receptor (SRC kinase). The interaction imbalance andbinding instabilities provide convincing clues about the insufficient inhibition of T cell activation and/orineffective clearance of autoimmune clones—a hallmark of several autoimmune disorders. In conclusion, thepresent research describes the association of 2 hotspot mutations inIL-4promoter andPTPN22gene with RAsusceptibility in the Pakistani study cohort. It also details how a functional mutation inPTPN22impacts theoverall protein geometry, charge, and/or receptor interactions to contribute to RA susceptibility.
https://www.liebertpub.com/doi/epdf/10.1089/jir.2022.0216

Department of Physics

1) **Azam, S., Imran, M., Rahman, A. U., Nadeem, A., & Neffati, R. (2023). Electronic and optical properties of quaternary selenides for optoelectronic applications: Insights from DFT+ U-computations. *International Journal of Quantum Chemistry,* 123(3). e27025. doi: 10.1002/qua.27025. Asif Nadeem (Physics/SSC) Date of Publications: February 5 2023 HJRS: X (Clay)**

The optical properties, electronic charge density, electronic structure of the new layered selenides materials, BaGdCuSe3, CsUCuSe3, CsZrCuSe3, and CsGdZnSe3 compounds have been calculated by using the full potential and linear augmented plane wave (FP-LAPW) methods as applied in the WIEN2k package, which is based on the density functional theory. The ALnMSe3 compound's structure of these was (A = Cs, Ba; Ln = Zr, Gd, U; M = Cu, Zn) is composed of (n = 1, 2) layers, which might be separated by A atoms. It is to be observed that there is strong hybridization between the s, p, and d states of Zr, Gd, and Cu atoms. Around the gadolinium atom, the charge density contours are completely circular, but the Gadolinium “Gd” atom shows an ionic nature. To calculate the refractive index, we used Kramer's Kronig correlations with the imaginary part dielectric function. The decrease in the refractive index is due to the lack of probability for direct excitation of the electrons, resulting in a loss of energy. The value of the static refractive index for all reference compounds is about 1.75–2.25, which is indication that the material used in optoelectronic devices.
https://onlinelibrary.wiley.com/doi/full/10.1002/qua.27025

2) **Sadaqat, A., Ali, G., ul Hasan, M., Iftikhar, F. J., Khalid, S., Khalique, U., & Karamat, S. (2023). Laminar-protuberant like p-FeS2 rooted in mesoporous carbon sheets as high capacity anode for Na-ion batteries. *Electrochimica Acta*, *439*, 141650.doi: 10.1016/j.electacta.2022.141650. Sidra Khalid (Physics/SSC) Date of Publication: 20 January 2023 HJRS: W (Gold)**

Iron sulfide (FeS2) serves as tempting anode material for sodium-ion batteries (SIBs) owing to their higher theoretical specific capacity and truncated cost. However, the huge volume expansion during electrochemical cycling lowers the electro-conductivity and restricts their practical usage. In this study, a FeS2/carbon hybrid composite has been prepared through hydrothermal reaction and tested as a negative electrode for SIBs. The morphological analysis presents void betwixt p-FeS2 particles, ensuring structural reliability. X-ray photoelectron spectroscopy and X-ray absorption spectroscopy techniques are executed to examine the chemical environment and oxidation states for discharged/charged FeS2/C. When tested as an anode, the initial sodiation/desodiation capacity was recorded as 679/562 mAh g−1 at a rate of 0.05 C (where 1 C = 447 mA g−1). The rate performance of FeS2/C was evaluated in a range of 0.05–10.0 C where the material delivers a capacity of 319 mAh g−1 at 10.0 C. The FeS2/C composite exhibited an excellent Na storage capacity of 402 mAh g−1 after 200 cycles at 0.05 C with capacity retention and coulombic efficiency of 72% and 99.5%, respectively. The improved adsorption of Na-ions, good rate capacity and cycling stability is promoted from the synergistic interaction among FeS2 particles sited on the conductive sheets of mesoporous carbon matrix. Moreover, mesoporous carbon matrix is deemed responsible for better charge transfer and suppressing volume expansion during insertion/extraction cycles.
https://www.sciencedirect.com/science/article/pii/S0013468622018060

3) **Kanwal, S., Jamil, M. I., Tariq Mirza, M. S., Ahmed, A., & Alrashdi, A. O. (2023). Elucidating the Effect of Pressure on Structural, Electronic, Magnetic, Mechanical and Thermal Properties of Mn2ZrZ (Z= Ge and Si): DFT Overview. *ECS Journal of Solid State Science and Technology*. 12(1).doi: 10.1149/2162-8777/acaf18. Shamsha Kanwal, Muhammad Imran Jamil (Physics/SSC) Date of publication: January 2023 HJRS: X (Clay)**

In this work, structural, electronic, magnetic, thermal and mechanical properties of Mn2ZrZ (Z=Ge and Si) under pressure up to 50 GPa is studied using state of the art density functional theory. In structural properties, under pressure ground state optimizations are performed to check the thermodynamic stability of studied alloys. Furthermore, enthalpy of formation and elastic stability criteria affirms the thermodynamic stability in studied alloys. Pugh ratio suggests that Mn2ZrGe and Mn2ZrSi remain ductile and brittle in nature, respectively throughout pressure up to 50 GPa. Moreover, large elastic anisotropic response is observed for both alloys. In electronic properties density of states and band gaps are discussed in detail which affirms the ferromagnetic half metallic nature of alloys. Our computed results, such as optimized ground state lattice constant, band-gap and magnetic moment are consistent and have matched excellently with available literature at ambient conditions. In mechanical properties, Debye temperature factor, minimum thermal conductivity and melting temperature is observed to increase with pressure while, Grüneisen anharmonicity factor decreases. However, to date, there are no reports available in literature with under pressure results up to 50 GPa. Therefore, this work illustrates new findings of Mn2ZrZ under pressure for potential applications in thermal actuators and spintronic devices. © 2023 The Electrochemical Society ("ECS").
https://iopscience.iop.org/article/10.1149/2162-8777/acaf18/meta

4) **Ain, Q., Ullah, H., & Munir, J. (2023). Structural, optoelectronic and thermal response of new stable MgBe2X2 (X= As, P) Zintl phases: First-principles calculation. *Materials Science and Engineering: B, 287*, 116136.doi: 10.1016/j.mseb.2022.116136. Quratul Ain (Physics/SSC) Date of publication: January 2023 HJRS: W (Honorable Mention)**

Highly-accurate computational predictions of suitable thermoelectric materials have sparked interest in discovering new Zintl phases. We report a detailed first-principles study to investigate the ground-state structural, electronic, optical and thermoelectric properties of MgBe2X2 (X = As, P) Zintl phases. Both compounds' optimized energy-volume curves, negative formation energies and phonon dispersion curves confirm their stability. A semiconductor nature is observed with bandgap values of 1.04 eV and 1.20 eV for MgBe2As2 and MgBe2P2, respectively. The optical response of the studied phases shows their potential to use in optoelectronic devices. Semi-classical Boltzmann theory is implemented through BoltzTraP code to calculate the thermal response. High Seebeck values are achieved at room temperature as well as at high temperatures. The power factor also shows an increase with the temperature increase. Furthermore, the figure of merit (ZT) shows good value of 0.74 for MgBe2As2 and 0.75 for MgBe2P2. A good optical and thermoelectric response of the studied phases opens the opportunity to use them in optoelectronic and thermoelectric applications.
https://www.sciencedirect.com/science/article/pii/S0921510722005244

Dr. Hasan Murad School of Management (HSM)

Department of Banking and Finance

1) **Naeem, M. A., Yousaf, I., Karim, S., Tiwari, A. K., & Farid, S. (2023). Comparing asymmetric price efficiency in regional ESG markets before and during COVID-19. *Economic Modelling, 118*, 106095.doi: 10.1016/j.econmod.2022.106095. Saqib Farid (Banking and Finance/HSM) Date of Publication: January 2023 HJRS: W (Silver)**

The ever-emerging environmental, social, and governance (ESG) concerns have received significant attention of policymakers, governments, regulation bodies, and investors. Considering the markets volatilities due to economic and financial uncertainties that can drive the informational price inefficiencies across the markets, this study compares the asymmetric price efficiency of regional ESG markets by using an asymmetric multifractal detrended fluctuation analysis before and during COVID-19 crisis. We then examine whether global factors influence the asymmetric efficiency of regional ESG markets. Our findings reveal that COVID-19 outbreak reduced the efficiency of regional ESG markets, except for Europe, which sustained its efficiency even during the pandemic. Moreover, global factors drive the efficiency of regional ESG markets significantly before and during COVID-19. A major implication of our findings stems from the fact that a contagion reduces the efficiency of the markets while stable economic conditions make those markets informationally efficient.
https://www.sciencedirect.com/science/article/pii/S0264999322003327

2) **Arshed, N., Sohail, H., & Gulzar, M. (2023). Investigating the Institutional Quality Integration with Islamic Banking Development in Promoting Entrepreneurship. *Journal of Entrepreneurship and Business Venturing,* 3(1), 16-36 doi: https://doi.org/10.56536/jebv.v3i1.25. Hadia Sohail (Banking & Finance/HSM) Muhammad Gulzar (SCA) Date of Publication: February 2023 HJRS: Y (Null)**

Empirically, conventional finance has proven insufficient while providing the required finance for startups and entrepreneurs. While handling the risks, entrepreneurs tend to avoid the high-cost nature of the debt, which limits

their true potential leading to sub-optimal resource utilization. For this, Islamic finance provides a participative and equitable alternative for new ventures with proven merits, but a lack of supporting regulation hinders its penetration among entrepreneurial aspirants. Islamic banks face high compliance costs to the current institutional requirements while designing the products for new ventures. This study investigates how Islamic finance assists entrepreneurial decisions and the role of institutional quality in aligning Islamic law with commercial law requirements. This study selected the unbalanced panel data of 37 countries between 2011 and 2020 and used panel quantile regression to estimate the quadratic Islamic financial development effects and the moderation of institutional quality. The results showed that generally, Islamic financial development has a U shaped relation with entrepreneurship, but with the improvement in institutions, the U shape is flipped to inverted-U shape. This study points toward the potential of Islamic financing when coupled with better regulations for the economies which are developing the nascent Islamic financing system.
http://jebv.pk/index.php/JEBV/article/view/25

Department of Economics & Statistics

1. **Saleem, A., Sial, M. H., & Cheema, A. R. (2023). Does an asymmetric nexus exist between exports and economic growth in Pakistan? Recent evidence from a nonlinear ARDL approach. *Economic Change and Restructuring*, 56(1), 297-326. doi: 10.1007/s10644-022-09426-z. Maqbool Hussain Sial (Economics & Statistics/HSM) Date of Publication: February 2023 HJRS: X (Honorable Mention)**
A fundamental economic question is how nations can achieve long-term economic growth. One of the responses to this question is the export-led growth (ELG) hypothesis, which claims that rising exports are a key predictor of economic growth. In response, this study empirically investigates the asymmetric (nonlinear) and causal relationship between exports and economic growth using annual data from 1973 to 2020 in Pakistan. The asymmetric cointegration among variables is confirmed by the non-linear autoregressive distributed lag approach with a structural break. Long-term estimates conform to theoretical expectations, except for imports which are found to influence growth negatively. Further, human and physical capital both are positively contributing to economic growth. The major finding is that the effects of exports on economic growth are asymmetric, and economic growth in Pakistan reacts positively to the rise and fall of exports. The causality analysis supports the above findings and confirms a long-run asymmetric unidirectional causality from exports (with positive/negative change) to economic growth in Pakistan, clearly demonstrating the ELG hypothesis. From a policy perspective, the findings suggest that Pakistan should adopt and implement an export growth strategy to achieve economic prosperity as part of its development policy.
https://link.springer.com/article/10.1007/s10644-022-09426-z

2. **Sardar, M. S., Asghar, N., Munir, M., Alhajj, R., & Rehman, H. U. (2023). Moderation of Services' EKC through Transportation Competitiveness: PQR Model in Global Prospective. *International Journal of Environmental Research and Public Health*, *20*(1), 293.doi: 10.3390/ijerph20010293. Muhammad Shahzad Sardar, Mubbashir Munir, Hafeez-ur-Rehman (Economics & Statistics/HSM) Date of Publication: January 2023 HJRS: W (Gold)**
The continuously increasing GHG emissions have created environmental pollution and several challenges to ecosystems and biodiversity. The challenges of climate change are multipronged, resulting in melting glaciers, flash floods, and severe heat waves. In this regard, the adaptive and mitigation strategies to manage the consequences of climate change are highly important. The transport sector creates a quarter of carbon emissions, and this share is continuously increasing. Accordingly, this research study uses transport competitiveness to determine carbon emissions of the transport sector for 121 countries covering the time period from 2008 to 2018. The Panel Quantile Regression (PQR) technique is engaged to analyze the study results. The findings highlight that transport competitiveness tends to increase carbon emissions of the transport sector across quantile groups 1 and 3, while it reduces carbon emissions in quantile group 2. The U-shaped services' EKC is validated in quantile groups 2 and 4. The moderation engaged, i.e., transportation competitiveness, changes the turning point of the services' EKC across quantile groups 2 and 4. However, in the high-CO2 quantile group, the moderation impact of transport competitiveness is strongest as it reduces the sensitivity by flattening the services' EKC. Furthermore, the planned expansion of the population and improved institutional quality tend to mitigate carbon emissions across different quantile groups. The policy relevance/implications that are based on the study results/findings are made part of the research paper.
https://www.mdpi.com/1660-4601/20/1/293

3. **Gao, J., Hassan, M. S., Kalim, R., Sharif, A., Alkhateeb, T. T. Y., & Mahmood, H. (2023). The role of clean and unclean energy resources in inspecting N-shaped impact of industrial production on environmental quality: A case of high polluting economies. *Resources Policy*, *80*, 103217.doi: 10.1016/j.resourpol.2022.103217.**

Muhammad Shahid Hassan, Rukhsana Kalim (Economics & Statistics/HSM) Date of Publication: January 2023 HJRS: W (Gold)

This study is designed to probe the N-shaped consequence of industrial production on environmental quality from both traveling and production for the selected high-polluting country groups. The strength of this impact will be tested by considering renewable and polluting energy sources as controlled inputs in the proposed functional forms. The study utilizes a panel over an annual data series from 1990 to 2021 and uncovers the evidence of the N-formed influence of industrial production on carbon emission from traveling and production in long run. A similar is true for the short run but the coefficients are witnessed as insignificant. The study also reports the optimal level of industrial production where carbon emission from traveling and production turns out to be minimum in the selected country groups. For instance, at the values of industrial production such as 3.37 percent, 2.64 percent, and 3.31 percent, carbon emission from traveling turns out to be minimum while at the values of industrial production like 10.49 percent, 1.80 percent, and 3.34 percent, carbon emission from production becomes minimum. Beyond these optimal levels of output from industry, it will not remain environmentally friendly anymore. The findings further expose that renewable energy significantly improves environmental quality based on traveling and production in the long and short run while nonrenewable energy significantly deteriorates environmental quality based on traveling and production in long run but in the short run it only hurts environmental quality from production. According to the causality test, production from industry and environmental quality from traveling and production significantly cause each other while a feedback effect is witnessed between renewable energy and environmental quality from traveling and production, and similar results are found between fossil-based energy and environmental quality from traveling and production. Based on these findings, this research proposes that industrial output should not be stimulated beyond minimum threshold points as it will become harmful to the environment in the selected high-polluting economies. More investments in renewable energy-related activities will be expanded for improving environmental quality in the selected high-polluting country groups.

https://www.sciencedirect.com/science/article/pii/S0301420722006602

4. **Ain, Q. U., Mahmood, M. A., Raza, S. M. M., & Zakir, A. (2023). An Acoustic Investigation of Primary and Secondary Lexical Stress of Urdu. *GEMA Online Journal of Language Studies,* 23(1), 74-92. doi: http://doi.org/10.17576/gema-2023-2301-05. Syed Muhammad Muslim Raza (Economics & Statistics/HSM) Date of Publication: February 2023 HJRS: W (Bronze)**

This paper investigated acoustic correlates of primary and secondary stress in Urdu language. Urdu is not a sufficiently researched language in the context of lexical stress. A few researches (Mehrotra, 1965; Hussain, 1997; Nair, 1999; Mumtaz, 2014, and Qurrat-Ul-Ain & Mahmood (2017) discussed stress in Urdu/Hindi language. Perhaps, Qurrat-Ul-Ain & Mahmood (2017) study is the first to phonetically document the presence of secondary stress in Urdu using the cue of duration. The present study focused on the four popular acoustic cues of lexical stress to see how Urdu lexical stress (primary as well as secondary) behaves against these cues. The stimuli of the study consist of six tri-syllabic words (embedded with low-back-long vowel /a:/ in all syllables) uttered by nine female Urdu speakers from Lahore. Four popular stress cues (duration, vowel quality, pitch, and intensity) have been analyzed to see their correlation with Urdu lexical stress. The analysis reveals three levels of lexical stress: primary, secondary, and unstressed. Vowel duration is the strongest cue to correlate with the levels of stress in Urdu while stressed segments prone to have higher values of intensity. Overall, a trend of lower F0 and higher formant values could be seen against stressed syllables. The study, however, needs to be expanded further by using words having other vowel sounds. Moreover, the phenomenon of word final lengthening can be taken into account in the potential researches.

https://ejournal.ukm.my/gema/article/view/57128

Department of Quantitative Method

1. **Mehmood, Q., Arshad, H. M., Noreen, K., Munir, I., Salam, A., & Ahmed, R. (2023). Some New Constructors for Minimal Circular Partially Balanced Neighbor Designs. *Journal of Statistics Applications and Probability,* 12(1), 93-99. doi: 10.18576/jsap/120110. Qaiser Mehmood (Quantitative Method/HSM) Date of Publication: January 2023 HJRS: X (Clay)**

Minimal circular neighbor designsa are economical to minimize the bias due to neighbor effects for v odd. For v even, minimal circular partially balanced neighbor designs (MCPBNDs) are used. Generators to obtain MCPBNDs-II in equal, two and three different blocks sizes are available in literature for c = 0 and 1, where c is remainder if m is divided by 4, m = (v − 2)/2 and v is number of treatments. These designs have not been constructed for c = 2 and 3. To complete the construction of this class of neighbor designs, MCPBNDs-II are, therefore, constructed for the remaining cases. MCPNBDs-II are the neighbor designs in which 3v/2 pairs of different treatments do not appear as neighbors.

https://digitalcommons.aaru.edu.jo/jsap/vol12/iss1/10/

Department of Management

1. **De Clercq, D., Haq, I. U., & Azeem, M. U. (2023). Ignoring leaders who break promises or following god: How depersonalization and religious faith inform employees' timely work efforts. *British Journal of Management*, *34*(1), 16-36.doi: 10.1111/1467-8551.12573. Muhammad Umer Azeem (Management/HSM) Date of Publication: January 2023 HJRS: W (Gold)**
   This study investigates the relationship between employees' perceptions of psychological contract breaches and their failure to meet work-related deadlines, with a particular focus on the mediating role of the depersonalization they assign to organizational authorities and the moderating role of their religious faith. Results based on multisource data, collected among employees and their supervisors in Pakistani organizations, show that an important factor that underpins the connection between beliefs about broken organizational promises and a diminished propensity to finish work on time is that employees depersonalize organizational leaders. This mediating effect is mitigated by employees' religious faith. For organizations, this study thus identifies a key mechanism – exhibiting indifference to the people in charge – by which employees' frustrations about resource-depleting contract breaches may inadvertently escalate into ineffective time management, and it identifies some workers among whom this counterproductive dynamic is less likely, namely, employees who can draw from their religious faith.
   https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12573

Department of Marketing

1. **Ahmad, W., Jafar, R. M. S., Waheed, A., Sun, H., & Kazmi, S. S. A. S. (2023). Determinants of CSR and green purchase intention: Mediating role of customer green psychology during COVID-19 pandemic. *Journal of Cleaner Production,* 389, 135888. doi: https://doi.org/10.1016/j.jclepro.2023.135888. Abdul Waheed (Marketing/HSM) Date of Publication: February 2023 HJRS: W (Platinum)**
   COVID-19 is a viral disease also comprehended as a coronavirus pandemic that has compelled the world to revisit business strategies to encounter COVID-19 challenges. Over the last decade, ample research has been accomplished on corporate social responsibility (CSR) and circular economy. Nevertheless, a key research gap requires to be filled that how CSR can perform a foremost role in engaging stakeholders like consumers during the COVID-19 era. Drawing from the stakeholder theory, this research endeavors to probe CSR's impact on green purchase intention (GPI) with mediating role of green psychology (GP). Data for the study were gathered from mainland China employing convenience sampling and examined by utilizing SEM (Structural Equation Model). First, the study indicated a direct relationship between CSR and GPI as well as between CSR and GP within three streams, i.e., green trust (GT), green satisfaction (GS), and green perceived value (GPV). It is found that GT, GS, and GPV positively influence GPI whereas the positive mediating relationships of each GP factor were autonomously observed between CSR and GPI, respectively. This research can improve the understanding of the enterprises about consumers and how incorporating green activities may enhance consumers' GPI and GP during the COVID-19 pandemic. This study addresses numerous interesting and insightful implications for strategic management together with certain possibilities for prospective researchers. https://www.sciencedirect.com/science/article/pii/S095965262300046X

2. **Shahid, K., Yang, Q., Waheed, A., & Arif, F. (2023). Insights into consumers: exploring the impact of brand coolness on consumers' brand engagement with intervening role of brand love. *International Journal of Information Systems and Change Management,* 13(2), 131–147. doi: 10.1504/ijiscm.2022.129259. Abdul Waheed, Farrah Arif (Marketing/HSM) Date of Publication: February 2023 HJRS: Y (Null)**
   The goal of this study is to explore the relationships between brand coolness (BrC) and consumers' brand engagement (CBE) employing consumers' brand love (CBL) as a mediation within the realm of the hospitality industry of China. A systematised questionnaire was formed and stretched amongst 530 respondents to accomplish the responses. A total of 493 questionnaires were ultimately deemed and gauged using confirmatory factor analysis along with a structural model (SEM). The findings proved that BrC components such as attractiveness, rebelliousness, usability, desirability, reliability, and innovativeness of technology have a connection with CBE of the consumers. Brand love ensured the tie between BrC and CBE in the present instant. This study equips the ample indications and recommendations for service-oriented sectors, specifically the hospital industry. This study ought to contribute a substantial role in positioning the hospitality image as a brand to build up deeper interactions with consumers. This paper struggles to stimulate the perception of BrC, CBE, and brand love pointing out multifarious fascinating implications for hospitality management. Besides, work prospects are reported along with the lines of the current study drawbacks.
   https://dl.acm.org/doi/abs/10.1504/ijiscm.2022.129259

School of Systems & Technology (SST)

Department of Computer Science

1. **Abosaq, H. A., Ramzan, M., Althobiani, F., Abid, A., Aamir, K. M., Abdushkour, H., . . . Rahman, S. (2023). Unusual Driver Behavior Detection in Videos Using Deep Learning Models. *Sensors,* 23(1). doi: 10.3390/s23010311. Muhammad Ramzan, Adnan Abid (Computer Science\SST) Date of Publication: January 2023 HJRS: W (Bronze)**
Anomalous driving behavior detection is becoming more popular since it is vital in ensuring the safety of drivers and passengers in vehicles. Road accidents happen for various reasons, including health, mental stress, and fatigue. It is critical to monitor abnormal driving behaviors in real time to improve driving safety, raise driver awareness of their driving patterns, and minimize future road accidents. Many symptoms appear to show this condition in the driver, such as facial expressions or abnormal actions. The abnormal activity was among the most common causes of road accidents, accounting for nearly 20% of all accidents, according to international data on accident causes. To avoid serious consequences, abnormal driving behaviors must be identified and avoided. As it is difficult to monitor anyone continuously, automated detection of this condition is more effective and quicker. To increase drivers' recognition of their driving behaviors and prevent potential accidents, a precise monitoring approach that detects abnormal driving behaviors and identifies abnormal driving behaviors is required. The most common activities performed by the driver while driving is drinking, eating, smoking, and calling. These types of driver activities are considered in this work, along with normal driving. This study proposed deep learning-based detection models for recognizing abnormal driver actions. This system is trained and tested using a newly created dataset, including five classes. The main classes include Driver-smoking, Driver-eating, Driver-drinking, Driver-calling, and Driver-normal. For the analysis of results, pre-trained and fine-tuned CNN models are considered. The proposed CNN-based model and pre-trained models ResNet101, VGG-16, VGG-19, and Inception-v3 are used. The results are compared by using the performance measures. The results are obtained 89%, 93%, 93%, 94% for pre-trained models and 95% by using the proposed CNN-based model. Our analysis and results revealed that our proposed CNN base model performed well and could effectively classify the driver's abnormal behavior.
https://www.mdpi.com/1424-8220/23/1/311

2. **Farooq, M. S., Khalid, H., Arooj, A., Umer, T., Asghar, A. B., Rasheed, J., ... & Yahyaoui, A. (2023). A Conceptual Multi-Layer Framework for the Detection of Nighttime Pedestrian in Autonomous Vehicles Using Deep Reinforcement Learning. *Entropy*, *25*(1), 135.doi: 10.3390/e25010135. Muhammad Shoaib Farooq, Haris Khalid (Computer Science/SST) Date of Publication: January 2023 HJRS: W (Bronze)**
The major challenge faced by autonomous vehicles today is driving through busy roads without getting into an accident, especially with a pedestrian. To avoid collision with pedestrians, the vehicle requires the ability to communicate with a pedestrian to understand their actions. The most challenging task in research on computer vision is to detect pedestrian activities, especially at nighttime. The Advanced Driver-Assistance Systems (ADAS) has been developed for driving and parking support for vehicles to visualize sense, send and receive information from the environment but it lacks to detect nighttime pedestrian actions. This article proposes a framework based on Deep Reinforcement Learning (DRL) using Scale Invariant Faster Region-based Convolutional Neural Networks (SIFRCNN) technologies to efficiently detect pedestrian operations through which the vehicle, as agents train themselves from the environment and are forced to maximize the reward. The SIFRCNN has reduced the running time of detecting pedestrian operations from road images by incorporating Region Proposal Network (RPN) computation. Furthermore, we have used Reinforcement Learning (RL) for optimizing the Q-values and training itself to maximize the reward after getting the state from the SIFRCNN. In addition, the latest incarnation of SIFRCNN achieves near-real-time object detection from road images. The proposed SIFRCNN has been tested on KAIST, City Person, and Caltech datasets. The experimental results show an average improvement of 2.3% miss rate of pedestrian detection at nighttime compared to the other CNN-based pedestrian detectors.
https://www.mdpi.com/1099-4300/25/1/135

3. **Malik, H., Naeem, A., Naqvi, R. A., & Loh, W. K. (2023). DMFL_Net: A Federated Learning-Based Framework for the Classification of COVID-19 from Multiple Chest Diseases Using X-rays. *Sensors*, *23*(2), 743.doi: 10.3390/s23020743. Hassaan Malik, Ahmad Naeem (Computer Science/SST) Date of Publication: January 2023 HJRS: W (Bronze)**
Coronavirus Disease 2019 (COVID-19) is still a threat to global health and safety, and it is anticipated that deep learning (DL) will be the most effective way of detecting COVID-19 and other chest diseases such as lung cancer (LC), tuberculosis (TB), pneumothorax (PneuTh), and pneumonia (Pneu). However, data sharing across hospitals is hampered by patients' right to privacy, leading to unexpected results from deep neural network (DNN) models.

Federated learning (FL) is a game-changing concept since it allows clients to train models together without sharing their source data with anybody else. Few studies, however, focus on improving the model's accuracy and stability, whereas most existing FL-based COVID-19 detection techniques aim to maximize secondary objectives such as latency, energy usage, and privacy. In this work, we design a novel model named decision-making-based federated learning network (DMFL_Net) for medical diagnostic image analysis to distinguish COVID-19 from four distinct chest disorders including LC, TB, PneuTh, and Pneu. The DMFL_Net model that has been suggested gathers data from a variety of hospitals, constructs the model using the DenseNet-169, and produces accurate predictions from information that is kept secure and only released to authorized individuals. Extensive experiments were carried out with chest X-rays (CXR), and the performance of the proposed model was compared with two transfer learning (TL) models, i.e., VGG-19 and VGG-16 in terms of accuracy (ACC), precision (PRE), recall (REC), specificity (SPF), and F1-measure. Additionally, the DMFL_Net model is also compared with the default FL configurations. The proposed DMFL_Net + DenseNet-169 model achieves an accuracy of 98.45% and outperforms other approaches in classifying COVID-19 from four chest diseases and successfully protects the privacy of the data among diverse clients.
https://www.mdpi.com/1424-8220/23/2/743

4. **Alqahtani, A., Akram, S., Ramzan, M., Nawaz, F., Khan, H. U., Alhashlan, E., ... & Ali, Z. (2023). A Transfer Learning Based Approach for COVID-19 Detection Using Inception-v4 Model.** ***Intelligent Automation & Soft Computing*****, *35*(2) 1721-1736. doi: 10.32604/iasc.2023.025597. Muhammad Ramzan (Computer Science/SST) Date of Publication: February 2023 HJRS: X (Clay)**

Coronavirus (COVID-19 or SARS-CoV-2) is a novel viral infection that started in December 2019 and has erupted rapidly in more than 150 countries. The rapid spread of COVID-19 has caused a global health emergency and resulted in governments imposing lock-downs to stop its transmission. There is a significant increase in the number of patients infected, resulting in a lack of test resources and kits in most countries. To overcome this panicked state of affairs, researchers are looking forward to some effective solutions to overcome this situation: one of the most common and effective methods is to examine the X-radiation (X-rays) and computed tomography (CT) images for detection of Covid-19. How-ever, this method burdens the radiologist to examine each report. Therefore, to reduce the burden on the radiologist, an effective, robust and reliable detection system has been developed, which may assist the radiologist and medical specia-list in effective detecting of COVID. We proposed a deep learning approach that uses readily available chest radio-graphs (chest X-rays) to diagnose COVID-19 cases. The proposed approach applied transfer learning to the Deep Convolutional Neural Network (DCNN) model, Inception-v4, for the automatic detection of COVID-19 infection from chest X-rays images. The dataset used in this study contains 1504 chest X-ray images, 504 images of COVID-19 infection, and 1000 normal images obtained from publicly available medical repositories. The results showed that the proposed approach detected COVID-19 infection with an overall accuracy of 99.63%.
https://www.techscience.com/iasc/v35n2/48867

5. **Raza, R., Bajwa, U. I., Mehmood, Y., Anwar, M. W., & Jamal, M. H. (2023). dResU-Net: 3D deep residual U-Net based brain tumor segmentation from multimodal MRI.** ***Biomedical Signal Processing and Control*****, *79*, 103861.doi: 10.1016/j.bspc.2022.103861. Rehan Raza (Computer Science/SST) Date of Publication: January 2023 HJRS: W (Silver)**

Glioma is the most prevalent and dangerous type of brain tumor which can be life-threatening when its grade is high. The early detection of these tumors can improve and save the life of the patients. The automatic segmentation of brain tumor from magnetic resonance imaging (MRI) plays a vital role in treatment planning and timely diagnosis. Automatic segmentation is a challenging task due to the massive amount of information provided by MRI and the variation in the location and size of the tumor. Therefore, a reliable and authentic method to segment the tumorous region from healthy tissues accurately is an open challenge in the field of deep learning-based medical image analysis. This research paper presents an end-to-end framework for automatic 3D Brain Tumor Segmentation (BTS). The proposed model is a hybrid of the deep residual network and U-Net model (dResU-Net). The residual network is used as an encoder in the proposed architecture with the decoder of the U-Net model to handle the issue of vanishing gradient. The proposed model is designed to take advantage from low-level and high-level features simultaneously for making the prediction. In addition, shortcut connections are employed between residual network to preserve low-level features at each level. Furthermore, skip connections between residual and convolutional blocks in the proposed architecture are used to accelerate the training process. The proposed architecture achieved promising results with the average dice score for the tumor core (TC), whole tumor (WT), and enhancing tumor (ET) on the BraTS 2020 dataset of 0.8357, 0.8660, and 0.8004, respectively. To demonstrate the robustness of the proposed model in real-world clinical settings, validation of the trained model on an external cohort is performed on randomly selected 50 patients of the BraTS 2021 benchmark dataset. The achieved dice scores on the external cohort are 0.8400, 0.8601, and 0.8221 for TC, WT, and ET, respectively. The comparison of results of the proposed

approach with the state-of-the-art techniques indicates that dResU-Net can significantly improve the segmentation performance of brain tumor sub-regions.
https://www.sciencedirect.com/science/article/pii/S1746809422003809

6. **Malik, H., Anees, T., Naeem, A., Naqvi, R. A., & Loh, W.-K. (2023). Blockchain-Federated and Deep-Learning-Based Ensembling of Capsule Network with Incremental Extreme Learning Machines for Classification of COVID-19 Using CT Scans. *Bioengineering,* 10(2), 203. Hassaan Malik, Ahmad Naeem (Computer Science/SST) Tayyaba Anees (Software Engineering/SST) Date of Publication: February 2023 HJRS: X (Clay)**
Due to the rapid rate of SARS-CoV-2 dissemination, a conversant and effective strategy must be employed to isolate COVID-19. When it comes to determining the identity of COVID-19, one of the most significant obstacles that researchers must overcome is the rapid propagation of the virus, in addition to the dearth of trustworthy testing models. This problem continues to be the most difficult one for clinicians to deal with. The use of AI in image processing has made the formerly insurmountable challenge of finding COVID-19 situations more manageable. In the real world, there is a problem that has to be handled about the difficulties of sharing data between hospitals while still honoring the privacy concerns of the organizations. When training a global deep learning (DL) model, it is crucial to handle fundamental concerns such as user privacy and collaborative model development. For this study, a novel framework is designed that compiles information from five different databases (several hospitals) and edifies a global model using blockchain-based federated learning (FL). The data is validated through the use of blockchain technology (BCT), and FL trains the model on a global scale while maintaining the secrecy of the organizations. The proposed framework is divided into three parts. First, we provide a method of data normalization that can handle the diversity of data collected from five different sources using several computed tomography (CT) scanners. Second, to categorize COVID-19 patients, we ensemble the capsule network (CapsNet) with incremental extreme learning machines (IELMs). Thirdly, we provide a strategy for interactively training a global model using BCT and FL while maintaining anonymity. Extensive tests employing chest CT scans and a comparison of the classification performance of the proposed model to that of five DL algorithms for predicting COVID-19, while protecting the privacy of the data for a variety of users, were undertaken. Our findings indicate improved effectiveness in identifying COVID-19 patients and achieved an accuracy of 98.99%. Thus, our model provides substantial aid to medical practitioners in their diagnosis of COVID-19.
https://www.mdpi.com/2306-5354/10/2/203

Department of Informatics and System

1. **Naqvi, M. R., Iqbal, M. W., Shahzad, S. K., Ashraf, M. U., Alsubhi, K., & Aljahdali, H. M. (2023). Ontological Model for Cohesive Smart Health Services Management. *CMC-Computer Materials & Continua*, *74*(2), 3679-3695. doi: 10.32604/cmc.2023.030340. Syed Khuram Shehzad (INFS/SST) M. Usman Ashraf (Computer Science/KUST) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
Health care has become an essential social-economic concern for all stakeholders (e.g., patients, doctors, hospitals etc.), health needs, private care and the elderly class of society. The massive increase in the usage of health care Internet of things (IoT) applications has great technological evolvement in human life. There are various smart health care services like remote patient monitoring, diagnostic, disease-specific remote treatments and telemedicine. These applications are available in a split fashion and provide solutions for variant diseases, medical resources and remote service management. The main objective of this research is to provide a management platform where all these services work as a single unit to facilitate the users. The ontological model of integrated healthcare services is proposed by getting requirements from various existing healthcare services. There were 26 smart health care services and 26 smart health care services to classify the knowledge-based ontological model. The proposed ontological model is derived from different classes, relationships, and constraints to integrate health care services. This model is developed using Protégé based on each interrelated/correlated health care service having different values. Semantic querying SPARQL protocol and RDF query language (SPARQL) were used for knowledge acquisition. The Pellet Reasoner is used to check the validity and relations coherency of the proposed ontology model. Comparative to other smart health care services integration systems, the proposed ontological model provides more cohesiveness.
https://101.32.70.228/cmc/v74n2/50214

2. **Gondal, F. K., Shahzad, S. K., Jaffar, M. A., & Iqbal, M. W. (2023). A Process Oriented Integration Model for Smart Health Services. *Intelligent Automation & Soft Computing,* 35(2), 1369-1386.doi: 10.32604/iasc.2023.028407. Syed Khuram Shehzad (Informatics and System/SST) Date of Publication: February 2023 HJRS: X (Clay)**
Cities are facing challenges of high rise in population number and con-sequently need to be equipped with latest smart services to provide luxuries of life to its residents. Smart integrated solutions are also a need to deal with the

social and environmental challenges, caused by increasing urbanization. Currently, the development of smart services' integrated network, within a city, is facing the barriers including; less efficient collection and sharing of data, along with inadequate collaboration of software and hardware. Aiming to resolve these issues, this paper recommended a solution for a synchronous functionality in the smart services' integration process through modeling technique. Using this integration modeling solution, at first, the service participants, processes and tasks of smart services are identified and then standard illustrations are developed for the better understanding of the integrated service group environment. Business process modeling and notation (BPMN) language based models are developed and discussed for a devised case study, to test and experiment i.e., for remote healthcare from a smart home. The research is concluded with the integration process model application for the required data sharing among different service groups. The outcomes of the modeling are better understanding and attaining maximum automation that can be referenced and replicated.
https://www.techscience.com/iasc/v35n2/48894

3. **Alyas, T., Tabassum, N., Iqbal, M. W., Alshahrani, A. S., Alghamdi, A., & Shahzad, S. K. (2023). Resource Based Automatic Calibration System (RBACS) Using Kubernetes Framework. *Intelligent Automation & Soft Computing*, *35*(1), 1165-1179.doi: 10.32604/iasc.2023.028815. Syed Khuram Shehzad (Informatics and System/SST) Date of Publication: January 2023 HJRS: X (Clay)**
Kubernetes, a container orchestrator for cloud-deployed applications, allows the application provider to scale automatically to match the fluctuating intensity of processing demand. Container cluster technology is used to encapsu-late, isolate, and deploy applications, addressing the issue of low system reliabil-ity due to interlocking failures. Cloud-based platforms usually entail users define application resource supplies for eco container virtualization. There is a constant problem of over-service in data centers for cloud service providers. Higher operating costs and incompetent resource utilization can occur in a waste of resources. Kubernetes revolutionized the orchestration of the container in the cloud-native age. It can adaptively manage resources and schedule containers, which provide real-time status of the cluster at runtime without the user's contribution. Kuber-netes clusters face unpredictable traffic, and the cluster performs manual expansion configuration by the controller. Due to operational delays, the system will become unstable, and the service will be unavailable. This work proposed an RBACS that vigorously amended the distribution of containers operating in the entire Kubernetes cluster. RBACS allocation pattern is analyzed with the Kuber-netes VPA. To estimate the overall cost of RBACS, we use several scientific benchmarks comparing the accomplishment of container to remote node migra-tion and on-site relocation. The experiments ran on the simulations to show the method's effectiveness yielded high precision in the real-time deployment of resources in eco containers. Compared to the default baseline, Kubernetes results in much fewer dropped requests with only slightly more supplied resources.
https://techscience.com/iasc/v35n1/48179/html

Department of Software Engineering

1. **Anjum, M. J., Anees, T., Tariq, F., Shaheen, M., Amjad, S., Iftikhar, F., & Ahmad, F. (2023). Space-Air-Ground Integrated Network for Disaster Management: Systematic Literature Review. *Applied Computational Intelligence and Soft Computing*, 2023, 6037882. doi: 10.1155/2023/6037882. Tayyaba Anees (Software Engineering/SST) Date of Publication: February 2023 HJRS: X (Clay)**
The occurrence of any kind of natural disaster will eventually lead to the loss of life and property. Countries where such disasters occur make every effort to monitor such disasters and aid as quickly as possible. However, in some cases, a rescue cannot be sent because no information is available to initiate any type of rescue operation. This is usually because common disaster management systems (DMS) use on board or ground networks to route information from the disaster scene to rescue headquarters (HQ), which in most cases cannot provide the information efficiently. One effective approach is to use satellites in conjunction with existing air-to-ground systems. This study provides a comprehensive and systematic overview of the complexities of the space-air-ground integrated network (SAGIN) in disaster management applications, including different architectures and protocols. The main rationale behind this review is to provide an extensive analysis of existing disaster management systems that are making use of SAGIN. This paper also presents the taxonomy for disaster management systems and challenges. Moreover, this research work also highlights open research issues and challenges for any type of disaster scenario. Our results indicate that several challenges are faced by disaster management systems such as hardware-based challenges, network-based characteristics and communication protocols related challenges, availability and accuracy of imagery data, and security and privacy issues.
https://www.hindawi.com/journals/acisc/2023/6037882/

School of Engineering (SEN)

Department of Civil Engineering

1. **Ali, H., & Abdullah, M. (2023). Exploring the perceptions about public transport and developing a mode choice model for educated disabled people in a developing country. *Case Studies on Transport Policy*, *11*, 100937.doi: 10.1016/j.cstp.2022.100937. Hassan Ali, Mohammad Abdullah (Civil Engineering/SEN) Date of publication: March 2023 HJRS: X (Honorable Mention)**

   People with disabilities are an important part of every community. However, they often face problems while using public transport, which results in several negative consequences including social exclusion. This study aims at exploring the problems faced by persons with disabilities (PWDs) while using public transport along with their mode choice in Lahore, Pakistan. This study uses a questionnaire-based approach to collect the data. Exploratory factor analysis is conducted to extract the underlying factors describing the perceptions of the PWDs about the issues with public transportation. It also uses non-parametric tests such as Kruskal Wallis and Mann Whitney U tests to determine the effects of demographic variables on the underlying factors. In addition, it estimates a binary logit model to determine the mode choice of PWDs in Lahore, Pakistan. The non-parametric tests on underlying factors indicated that females declared higher level of agreement with spatial and financial inequity and infrastructural inaccessibility as compared to males. Furthermore, those traveling with wheel chairs showed significantly higher level of agreement with service inadequacy as compared to those without any mobility aids. The binary logit model indicated that female PWDs are less likely to use public transport relative to other modes when compared to the male respondents. The respondents belonging to the higher income categories are less likely to use public transport relative to other modes when compared to the lowest-income category. The respondents who do not own a vehicle are more likely to use public transport relative to other modes when compared to those who own a vehicle. In the logit model, gender, household income, use of mobility aids, primary purpose of traveling, vehicle ownership, and infrastructural inaccessibility were found to be significant predictors of mode choice. Although transport-related policies exist for PWDs, more specific policies and stricter implementation is required to improve the accessibility and public transport ridership of PWDs.

   https://www.sciencedirect.com/science/article/pii/S2213624X22002371

2. **Yang, Y., Tu, S., Ali, R. H., Alasmary, H., Waqas, M., & Amjad, M. N. (2023). Intrusion detection based on bidirectional long short-term memory with attention mechanism. *CMC-Computer Material and Continua,* 74(1), 801-815. doi: 10.32604/cmc.2023.031907. Muhammad Nouman Amjad (Civil Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**

   With the recent developments in the Internet of Things (IoT), the amount of data collected has expanded tremendously, resulting in a higher demand for data storage, computational capacity, and real-time processing capabilities. Cloud computing has traditionally played an important role in establishing IoT. However, fog computing has recently emerged as a new field complementing cloud computing due to its enhanced mobility, location awareness, heterogeneity, scalability, low latency, and geographic distribution. However, IoT networks are vulnerable to unwanted assaults because of their open and shared nature. As a result, various fog computing-based security models that protect IoT networks have been developed. A distributed architecture based on an intrusion detection system (IDS) ensures that a dynamic, scalable IoT environment with the ability to disperse centralized tasks to local fog nodes and which successfully detects advanced malicious threats is available. In this study, we examined the time-related aspects of network traffic data. We presented an intrusion detection model based on a two-layered bidirectional long short-term memory (Bi-LSTM) with an attention mechanism for traffic data classification verified on the UNSW-NB15 benchmark dataset. We showed that the suggested model outperformed numerous leading-edge Network IDS that used machine learning models in terms of accuracy, precision, recall and F1 score.

   https://www.techscience.com/cmc/v74n1/49832

Department of Industrial Engineering

1. **Usman, M., Ishfaq, K., Rehan, M., Raza, A., & Mumtaz, J. (2023). An in-depth evaluation of surface characteristics and key machining responses in WEDM of aerospace alloy under varying electric discharge environments. *The International Journal of Advanced Manufacturing Technology*, 124, 2437-2449. doi: 10.1007/s00170-022-10608-2. Abbas Raza (Industrial Engineering/SEN) Date of Publication: February 2023 HJRS: W (Silver)**
   Titanium and its alloys (especially Ti6Al4V) are widely employed in aerospace and biomedical industry. Wire electric discharge machining is common in practice to machine this difficult-to-cut material. But owing to the thermo-electric nature of the process, it is challenging to have adequate level of surface integrity. This primary concern needs to be addressed as it mainly influences the surface mechanical characteristics. Therefore, the present research aims to address the aforesaid issues using well-known multipass strategy. Understanding the multipass process dynamics and requirements, the potentiality of brass wire diameters was comprehensively examined and explored during WEDM of Ti6Al4V. Considering higher cost, unavailability, environmental hazards, and straightness issues of novel zinc-coated wire electrodes, readily available brass wires provide a cheaper and widely acceptable solution to enhance surface integrity of machined parts if equivalent results can be somehow made possible. For that sake, three different brass wire diameters; 0.15 mm, 0.2 mm, and 0.25 mm have been considered to evaluate their impact on surface roughness, recast layer thickness, overcut, machined surface microhardness, and cutting speed using multipass cutting technique. Experimental results revealed that 0.15 mm uncoated brass wire can produce white layer result equivalent to Topas Plus X wire (Cu core-double Zn-rich layer coating) which outperformed among all zinc-coated wires used in previously published research. Moreover, among different diameter brass wires, surface roughness is improved by 25% using multipass cutting with 0.15 mm diameter in comparison to its counterparts. Scanning electron microscope (SEM) analysis depicts that the said combination reduces recast layer thickness from 39.04 µm to 14.6 µm (~ 1.5 times lesser value). In addition to that, smaller diameter (0.15 mm) provides the maximum cutting rate in rough cuts (which consume maximum machining time) and dimensional accuracy.
   https://link.springer.com/article/10.1007/s00170-022-10608-2

2. **Mughal, K., Mughal, M. P., Farooq, M. U., Qaiser Saleem, M., & Haber Guerra, R. (2023). Helical Milling of CFRP/Ti6Al4V Stacks Using Nano Fluid Based Minimum Quantity Lubrication (NF-MQL): Investigations on Process Performance and Hole Integrity. *Materials*, *16*(2), 566.doi: 10.3390/ma16020566. Mohammad Pervez Mughal (Industrial Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**
   The structural components in the aeronautical industry require CFRP/Ti6Al4V stacks to be processed together, which results in poor hole integrity due to the thermal properties of the materials and challenges related to processability. These challenges include quality variation of the machined holes because of the limitations in process properties. Therefore, a novel solution through helical milling is investigated in the study using nano fluid based minimum quantity lubrication (NF-MQL). The analysis of variance shows, for Ti6Al4V, eccentricity (PCR = 28.56%), spindle speed (Ti) (PCR = 42.84%), and tangential feed (PCR = 8.61%), and for CFRP, tangential feed (PCR = 40.16%), spindle speed (PCR = 28.75%), and eccentricity (PCR = 8.41%) are the most significant parameters for diametric error. Further on, the rise in the circularity error is observed because of prolonged tool engagement at a higher value of tangential feed. Moreover, the surface roughness of Ti was reduced with an increasing percentage of MoS2 in the lubricant. The spindle speed (37.37%) and lubricant (45.76%) have a potential influence on the processing temperature, as evident in the analysis of variance. Similarly, spindle speed Ti (61.16%), tangential feed (23.37%), and lubrication (11.32%) controlled flank wear, which is critical to tool life. Moreover, the concentration of MoS2 decreased edge wear from ~105 µm (0.5% concentration) to ~70 µm (1% concentration). Thorough analyses on process performance in terms of hole accuracy, surface roughness, processing temperature, and tool wear are carried out based on the physical science of the process for cleaner production. The NF-MQL has significantly improved process performance and hole integrity.
   https://www.mdpi.com/1996-1944/16/2/566

Department of Electrical Engineering

1. **Alharbi, A. R., Tariq, H., Aljaedi, A., & Aljuhni, A. (2023). Latency-Aware Accelerator of SIMECK Lightweight Block Cipher. *Applied Sciences*, *13*(1), 161.doi: 10.3390/app13010161. Hassan Tariq (Electrical Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**

This article presents a latency-optimized implementation of the SIMECK lightweight block cipher on a field-programmable-gate-array (FPGA) platform with a block and key lengths of 32 and 64 bits. The critical features of our architecture include parallelism, pipelining, and a dedicated controller. Parallelism splits the digits of the key and data blocks into smaller segments. Then, we use each segmented key and data block in parallel for encryption and decryption computations. Splitting key and data blocks helps reduce the required clock cycles. A two-stage pipelining is used to shorten the critical path and to improve the clock frequency. A dedicated controller is implemented to provide control functionalities. For the performance evaluation of our design, we report implementation results for two different cases on Xilinx 7-series FPGA devices. For our case one, the proposed architecture can operate on 382, 379, and 388 MHz frequencies for Kintex-7, Virtex-7, and Artix-7 devices. On the same Kintex-7, Virtex-7, and Artix-7 devices, the utilized Slices are 49, 51, and 50. For one encryption and decryption computation, our design takes 16 clock cycles. The minimum power consumption is 172 mW on the Kintex-7 device. For the second case, we targeted the same circuit frequency of 50 MHz for synthesis on Kintex-7, Virtex-7, and Artix-7 devices. With minimum hardware resource utilization (51 Slices), the least consumed power of 13.203 mW is obtained for the Kintex-7 device. For proof-of-concept, the proposed SIMECK design is validated on the NEXYS 4 FPGA with the Artix-7 device. Consequently, the implementation results reveal that the proposed architecture is suitable for many resource-constrained cryptographic applications.
https://www.mdpi.com/2076-3417/13/1/161

2. **Ijaz, K., Adnan, M., Toor, W. T., Butt, M. A., Idrees, M., Ali, U., . . . Ashraf, S. R. (2023). A New Noise Shaping Approach for Sigma-Delta Modulators Using Two-Stage Feed-Forward Delays and Hybrid MASH-EFM.** ***Electronics,*** **12(3), 740. Khalid Ijaz (Electrical Engineering/SEN) Muhammad Adnan (Computer Science\SST) Syed Rehan Ashraf (Industrial Engineering/SEN) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
Sigma-delta modulators use a noise-shaping technique to curtail the noise power in the band of interest during digital-to-analog conversion. Error feedback modulator employs an efficient noise transfer function for time varying inputs than any other sigma-delta modulators. However, the efficiency of the conventional noise transfer function degrades and the quantizer saturation issue provokes when the input signal reaches to full scale. This work proposes a new noise transfer function which is a combination of transfer functions of two-stage Feed-forward delays and a novel Hybrid multi-stage noise shaping-error feedback sigma-delta modulator. The noise transfer function of two-stage Feed-forward delays mitigates the concern of quantizer saturation. The noise transfer function offered by the Hybrid multi-stage noise shaping-error feedback architecture provides sustainable solutions to limit cycles and idle tones. The simulation concludes that the proposed noise-shaping approach obtains comparatively high signal-to-quantization noise ratio than the conventional error feedback modulators. Other performance parameters like spurious-free dynamic range, effective number of bits and signal-to-noise plus distortion ratio are also significantly improved.
https://www.mdpi.com/2079-9292/12/3/740

3. **Iqbal, W., Ullah, I., & Shin, S. (2023). Nonimaging High Concentrating Photovoltaic System Using Trough.** ***Energies,*** **16(3), 1336. Waseem Iqbal, Irfan Ullah (Electrical Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**
Solar energy is a long-established technology, which has zero CO2 emissions, and provides low-cost energy for a given area of land. The concentrator photovoltaic (CPV) has been given preference over the photovoltaic due to its high efficiency. In a CPV system, most of the solar cell area has been replaced with an optical concentrator. Various parabolic trough based CPV systems have been presented where a concentration of <300 is achieved. In the current research, a design is presented to achieve a high concentration of 622×. The design consists of two stages of concentration including parabolic trough as a main concentrator and nonimaging reflective grooves as a secondary concentrator. The trough reflects the incident light towards the secondary reflector where the light is redirected over the solar cell. Design of the two-stage concentrator, ray-tracing simulation, and results are presented. The system achieved an optical efficiency of 79%. The system would also be highly acceptable in solar thermal applications owing to its high concentration.
https://www.mdpi.com/1996-1073/16/3/1336

Department of Mechanical Engineering

1. **Toor, Z. S., Baluch, A. H., Wadood, A., Rehman, A. U., Saleem, M., Butt, M. S., & Hayat, K. (2023). Impact based characterization of composites using a computational framework.** ***Acta Astronautica, 202,*** **705-714.doi: 10.1016/j.actaastro.2022.11.011. Khazar Hayat (Mechanical Engineering/SEN) Date of Publication: January 2023 HJRS: W (Silver)**

This article has employed a computational method to evaluate the dynamic response of Carbon fiber reinforced polymers composite material. Three Dimensional Computational Shell and Two Dimensional modelling of a protective system has been conducted by the authors using Finite Element Method. In order to simulate the influence of space debris impacts on carbon epoxy composites, velocity variation in high and hyper speed range has been conducted. Rigid elements were utilized to model the projectile, while three dimensional stress elements, Continuum Shell elements and Plane stress elements were used for three dimensional, Continuum Shell and two dimensional modelling of the plate. The computational results indicated a good convergence with the available experimental results with variation less than 10%. It was observed that the generated stresses, energy absorbed, damaged area as well as the computation time of the models increased with the subsequent increase in impacting velocity. An increase of 75% in the energy absorbed, 86% increase in the generated stress and 93% increase in the deformation was observed against an increase in the impact velocity from 150 m/s to 1674 m/s. A maximum increase of 12% in the overall damage area, 41% increase in delamination of plies and 95% enhanced computation time was also observed against the above mentioned velocity variation.
https://www.sciencedirect.com/science/article/pii/S009457652200618X

School of Social Science & Humanities (SSSH)

Department of Education

1. **Asghar, M. Z., Barbera, E., Rasool, S. F., Seitamaa-Hakkarainen, P., & Mohelská, H. (2023). Adoption of social media-based knowledge-sharing behaviour and authentic leadership development: evidence from the educational sector of Pakistan during COVID-19. *Journal of Knowledge Management*,27(1), 59-83. doi: 10.1108/JKM-11-2021-0892. Muhammad Zaheer Asghar (Education/SSSH) Date of Publication: January 2023 HJRS: W (Gold)**

This research paper aims to explore the influence of social media–based knowledge-sharing intentions (SMKI) on prospective authentic leadership development (ALD) to deal with the future crisis. In the existing literature, to the best of the authors' knowledge, there is no significant empirical evidence to test the relationship between SMKI and ALD. Thus, this study contributes to the growing literature regarding the role of SMKIs, ALD, social media–based knowledge-sharing behavior (SMKB) and facilitating conditions (FCs). However, in this study, the authors developed a conceptual framework based on technology adoption and leadership theory. It was used to identify preservice educational leaders' SMKIs and their effect on ALD to deal with an educational crisis during the COVID-19 pandemic. Furthermore, SMKIs are strengthening ALD, directly and indirectly, using SMKB and FCs. Design/methodology/approach: In this study, the higher education students are considered preservice leaders who were enrolled in educational leadership and management programs. However, this study's target population and sample are students enrolled in educational leadership and management programs. Therefore, higher education students are considered preservice educational leaders. Therefore, a multilevel questionnaire survey approach was adopted to collect data from preservice educational leaders (n = 451 at Time 1 and n = 398 at Time 2) enrolled in education departments in the selected universities in Pakistan. A total of 398 survey questionnaires were finalized with a return ratio of 89%. The partial least square structural equation modeling with SmartPLS 3.2.8 was used for the data analysis. Findings: This research found that SMKIs are positively and significantly connected with ALD. This study also confirms that SMKB significantly and positively mediates the relationship between SMKIs and ALD. Therefore, this study concludes that preservice educational leaders were ready to adopt SMKB. Practical implications: Social media–based knowledge sharing can be helpful to develop authentic leadership among preservice educational leaders during a crisis. Preservice educational leaders as authentic leaders can prove to be an asset in dealing with the COVID-19 pandemic crisis. Originality/value: This research integrated the technology adoption model and leadership theory to provide empirical evidence of SMKIs' direct and indirect influence on ALD through social media–based knowledge-sharing actual use behavior by preservice educational leaders during the COVID-19 pandemic. Moreover, the moderated mediating effect of the FCs was also studied in the relationship between SMKIs and actual user behavior as well as ALD.
https://www.emerald.com/insight/content/doi/10.1108/JKM-11-2021-0892/full/html

2. **Jabeen, S., Gul, F., & Bashir, I. (2023). Effect of Workplace Bullying on Job Satisfaction and Job Performance at School Level. *Global Sociological Review,* VIII(I), 21-39 p. Sadaf Jabeen, Fariha Gul, Irfan Bashir (Education/SSSH) Date of Publication: January 2023 HJRS: Y (Null)**

This study sought to determine the workplace bullying, job satisfaction, job performance and their effects on teachers. This quantitative study aims to highlight the issue of bullying which badly affects teachers. The sample was comprised of all schools in Lahore. A stratified random sampling strategy was used. Four hundred teachers were

selected from all schools in Lahore. The questionnaire consisted of 115 items. It was designed at a Likert. Data was analyzed through SPSS. The findings show a strong relationship between workplace bullying and job satisfaction and job performance. The findings highlight that demographic variables vary among teachers. The finding of this study that workplace bullying is increasing speedily, that suggests that organizational bullying might make teachers feel uncomfortable in their jobs, causing stress. These findings may be utilized to design successful solutions for not just preventing and managing bullying; but also for making schools safer for teachers.
https://www.gsrjournal.com/papers/ENv0bZdUxA.pdf

3. **Abid, N., Aslam, S., Alghamdi, A. A., & Kumar, T. (2023). Relationships among students' reading habits, study skills, and academic achievement in English at the secondary level. *Frontiers in psychology,* 14, 1020269-1020269. doi: 10.3389/fpsyg.2023.1020269. Nisar Abid (Education/SSSH) Date of Publication: January 2023 HJRS: W (Silver)**
Introduction: Reading is an attempt to comprehend the writer's message for personal growth and success in the relevant fields. Thus, psychologists consider it a multifaceted cognitive process of constructing meanings from texts. The present study was conducted to determine the relationships among students' reading habits, study skills, and academic achievement in English at the secondary level in Punjab, Pakistan. Methods: The (n = 1614) students enrolled in the science section for the academic year 2019–2020 participated in this descriptive correlational survey, selected from 40 high schools in Lahore, Punjab, Pakistan, through a non-proportionate stratified random sampling technique. The Reading Habits Questionnaire (RHQ) and the Study Skills Scale (SSS) were used to collect data about students' reading habits and study skills. At the same time, academic achievement was the students' grades obtained in the ninth class in the subject of English that were determined by the Board of Intermediate and Secondary Education (BISE) Lahore in 2019. Students' responses were analyzed through descriptive and inferential statistics. Results: The results indicated that students have competent reading habits and study skills. The correlational findings showed a strong positive relationship among reading habits, study skills, and academic achievement in English, while moderate positive relationships between reading habits and academic achievement in English. However, regression analysis results were significant, while reading habits and study skills moderately predicted academic achievement. Discussion: It is implicated that teachers should plan such assignments and tasks based on reflective thinking by considering the role of study skills in academic achievement. Moreover, teachers and school administrators could mutually create timetables for library lessons to build reading habits and study skills among learners.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9912844/pdf/fpsyg-14-1020269.pdf

Department of Islamic Thoughts and Civilization

1. **Bano, N., Ahmad, H., Hassan, J., & Razaq, R. (2023). Principles of Religious Pluralism. *Religions*, *14*(1), 20. doi: 10.3390/rel14010020. Humaira Ahmad (Islamic Thought and Civilization/SSSH) Date of Publication: January 2023 HJRS: W (Silver)**
Religious pluralism is growing in significance because of increasing religious diversity and increasing religious conflicts, which cause unrest in contemporary society. Muslim perennialists represent one of many groups advocating for the common goals of religious pluralism and the reaffirmation of perennial wisdom, which lies at the heart of all primordial religious traditions. The purpose of the study is to explore the principles of religious pluralism advocated by Muslim perennialist philosophers. Using the discourse analysis methodology, this study analyzed the theological validity of the Muslim perennialist perspective for articulating interfaith dialogue and co-existence in multicultural societies. By conducting this critical analysis, the study concludes that the principles of religious pluralism advocated by Muslim perennialists are the means of bringing interfaith peaceful co-existence to society.
https://www.mdpi.com/2077-1444/14/1/20

School of Design and Textile (SDT)

1. **Islam, S. R., Patoary, M. K., Yousif, A. H., Chaudary, A., Estifanos, H. D., Naveed, T., & Shao, H. (2023). SiO2 aerogels (SAs) coating on the surface of 3D weft-knitted spacer fabrics (WKSFs) used as sorbent in oil spill cleanup. *Journal of Water Process Engineering,* 51, 103451. doi: 10.1016/j.jwpe.2022.103451. Tayyab Naveed (SDT) Date of Publication: February 2023 HJRS: W (Bronze)**
Oily wastewater and advanced manufacturing organic pollutants are posing a serious global threat to the environment. Herein, SiO2 aerogels prepared from tetraethylorthosilicate (C8H20O4Si) by sol-gel method were coated 5 various 3D weft-knitted spacer fabrics (WKSFs) to study and compare the oil spill cleanup behavior in

different temperatures (20 °C, 30 °C, 40 °C, 50 °C, and 60 °C), oil, and water medium. SEM and BET were used to observe the surface morphology and specific surface area of WKSFs. FTIR-ATR and XRD for the microstructure of fabrics were used to characterize the surface changes induced by the silica aerogel coating. TGA was performed to clarify the thermal degradation of WKSFs. The findings demonstrated that entirely the sorbents, particularly sorbent 2, ensured significant oil weight gain (%) and retention rate (%) in all cases. Sorbent 2 (with a weight of 350 g/m2, a thickness of 3 mm, a stitch density of 1.58/inch, a fabric density of 117 kg/m3, and a spacer yarn arrangement angle of 79.96°) showed a higher oil weight gain (%) and retention rate (%) of ((763 ± 2.31 %, 758 ± 2.08 %, and 740 ± 2.52 %) and (88.92 ± 0.87 %, 88.74 ± 0.68 %, and 85.88 ± 1.02 %)) for vegetable oil and ((698 ± 2.65 %, 693 ± 2.52 %, and 673 ± 2.65 %) and (91.18 ± 0.83 %, 90.82 ± 0.75 %, and 88.16 ± 0.90 %)) for engine oil in temperature, oil, and water medium, respectively. The statistical study revealed that coated WKSFs performed significantly at the 0.05 level (P = 0.000). The outcomes also revealed that the varieties of 3D fabric physical structures, specific surface areas, pore sizes, pore volumes, porosity ratios, water contact angles, silica aerogel add-on %, surface roughness, thermal behaviors, temperatures, and oil characteristics all played a significant effect on oil weight gain and retention capacity, especially in the oil spill cleanup performance.
https://www.sciencedirect.com/science/article/pii/S2214714422008959

2. **Mohsin, M., Sardar, S., Akhtar, K. S., Anam, W., Ijaz, S., Afraz, N., & Jamil, A. (2023). Performance enhancement of water and energy efficient foam dyeing and finishing through different foaming agents. *Journal of Natural Fibers*, *20*(1), 2164102. doi: 10.1080/15440478.2022.2164102. Nadeem Afraz (SDT) Date of Publication: January 2023 HJRS: X (Clay)**
Foam dyeing and finishing is an ecofriendly alternative to conventional padding in textile processing. However, the generation and application of foam is a challenging task especially for wide range of dyes and chemicals due to technical and compatibility issues. In the foam dyeing and finishing process, foaming agent plays a central role. However, there is a lack of research on the compatibility of range of foaming agents with the range of different dyes and finishes. Therefore, in this research, foam was generated and optimized for seven different colorants including three reactive dyes, two direct dyes, and two pigments, and three different finishes including softener, oil and water repellent, and fire retardant using three different foaming agents separately. These foaming agents are alkyl dimethyl amine oxide, alkane sulfonate sodium salt, and ethoxylated decanol. Foam was successfully generated, optimized, and applied on the cotton fabric. Performance of the fabric samples treated with padding and three foaming agents for each dye and finish was evaluated. In most of the foam dyeing and foam finishing recipes, alkane sulfonate sodium salt-based foaming agent indicated the best dyeing and finishing properties and its performance was comparable with conventional padding in addition to significant savings of water, chemicals, and energy.
https://www.tandfonline.com/doi/full/10.1080/15440478.2022.2164102

3. **Jiang, L., Zulifqar, A., Hai, A. M., Anwar, F., Hu, H., Liu, F., & Chen, H. (2023). Effect of using alternate elastic and non-elastic yarns in warp on shrinkage and stretch behavior of bi-stretch woven fabrics. *Journal of Engineered Fibers and Fabrics*, *18*, 15589250221137897.doi: 10.1177/15589250221137897. Faiza Anwar (SDT) Date of Publication: 12 January 2023 HJRS: X (Clay)**
Stretch woven fabrics are known for their elastic and recovery properties. To date, they found many interesting applications from simple jeans to complex fabric structures with functional properties for example bi-stretch auxetic woven fabrics, compressions garments and stretchable textile carriers for healthcare applications. Many studies have been carried out on the physical, mechanical and comfort properties of stretchable knitted and woven fabrics. However, to identify combination of yarns with different stretch properties and other design parameters required to meet multiple objectives in the production and usage of bi-stretch woven fabrics is an area that has been taken up by fabric scientists recently. This study compared the effect of using elastic yarns and alternate elastic and non-elastic yarns in warp on the properties of bi-stretch woven fabrics while using elastic yarns in weft direction. It was found that shrinkage of the fabrics made of elastic yarns was higher along the warp direction as compared to that in weft direction due to shrinkage balancing effect; however, in case of fabrics made of alternate elastic and non-elastic yarns in warp the shrinkage behavior was exact opposite. The comparison of shrinkage for different weave patterns revealed that satin had the highest shrinkage followed by twill and plain, due to least number of interlacements in satin among these three patterns.
https://journals.sagepub.com/doi/full/10.1177/15589250221137897

4. **Islam, S. R., Hasan, M. M., Shen, X., Naveed, T., Patoary, M. K., Jiang, J., & Zareen, A. (2023). Sustainable decoloration of polluted water through cellulosic TiO2 nano-crystalline material composite using sono synthesis. *The Journal of the Textile Institute*, *114*(1), 75-87.doi; 10.1080/00405000.2021.2022827. Tayyab Naveed (SDT) Date of Publication: January 2023 HJRS: X (Honorable Mention)**

Titanium dioxide (TiO2) nanomaterials are noteworthy for their valuable photoactive properties and applications. Their cellulosic nano-particles could be used for the decoloration of polluted water since they are eco-friendly. Therefore, this study investigated the cellulose powder coated with a layer of nano-crystalline-titanium dioxide (TiO2) through the sonosynthesis process to minimize the hazardous of contaminated water containing reactive dyes. Powder X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), and Zeta Potential Spectroscopy were utilized to examine the subsequent composition. Decoloration of the compositions was perceived through Ultra Violet (UV) light at 30 min. It was observed that the composition simultaneously improved the quality (cleaning) of polluted water. It absorbed the reactive dye hastily in 2 min which is the fastest time reported up to now and transformed the polluted water quality into hygienic condition. Additionally, the cleaning efficiency of the polluted water was increased with the number of functional repeats. Thus, assisted in an eco-friendly remedy of wastewater and minimizing the pollution.
https://www.tandfonline.com/doi/full/10.1080/00405000.2021.2022827

School of Food and Agriculture Sciences (SFAS)

1. **Fu, X., Li, X., Ali, M., Zhao, X., Min, D., Liu, J., ... & Zhang, X. (2023). Methionine sulfoxide reductase B5 plays vital roles in tomato fruit defense response against Botrytis cinerea induced by methyl jasmona. *Postharvest Biology and Technology*. 196,112165 doi: 10.1016/j.postharvbio.2022.112165. Maratab Ali (SFAS) Date of Publication: February 2023 HJRS: W (Platinum)**

A methionine sulfoxide reductase (Msr) gene is identified in tomato fruit, and its protein's identity as MsrB5 was determined by phylogenetic analysis and multiple sequence alignment. Correspondingly, the role of SlMsrB5 in methyl jasmonate (MeJA)-mediated defense to B. cinerea in tomato fruit was investigated by using 0.05 mM MeJA treatment on SlMsrB5-silenced fruit during storage. The results showed that MeJA treatment upregulated total phenols and flavonoids, disease resistance enzymes activities, and expression of pathogenesis-related (PR) genes, including SlPR1/2a/2b/3a/3b/STH2 in tomato fruit. Additionally, MeJA inhibited the increase of hydrogen peroxide and superoxide anions by improving antioxidant enzyme activities and the ascorbic acid-glutathione (ASA-GSH) cycle. Similarly, MeJA induced the accumulation of jasmonic acid and the transcriptions of its signal transduction-related genes (SlCOI1 and SlMYC2), which could lead to the transcription of disease response-related marker genes such as SlPI I and SlPI II. These MeJA-regulated changes may contribute to improved disease resistance in tomato fruit. However, SlMsrB5 silence reduced the effect of MeJA on the above parameters and caused severer disease occurrence in the SlMsrB5-silenced + MeJA treated group than in MeJA treated group, probably because the low levels of SlMsrB5 transcription could not restore the activity of defense and antioxidant-related enzymes. Furthermore, correlation analysis revealed that the above effects regulated by MeJA were highly correlated with SlMsrB5 transcript levels. Therefore, these findings provide insight on SlMsrB5's role in MeJA-mediated tomato immune responses to B. cinerea by regulating defensive enzymes and genes, antioxidant capacity, and the JA signaling pathway.
https://www.sciencedirect.com/science/article/pii/S0925521422003337

2. **Aslam, M. Q., Hussain, A., Akram, A., Hussain, S., Naqvi, R. Z., Amin, I., ... & Mansoor, S. (2023). Cotton Mi-1.2-like Gene: A potential source of whitefly resistance. *Gene*, *851*, 146983. doi: 10.1016/j.gene.2022.146983. Athar Hussain (SFAS) Date of Publication: January 2023 HJRS: W (Honorable Mention)**

Whitefly (Bemisia tabaci) inflicts tremendous yield losses to cotton crops in many parts of the world by sap-sucking and transmitting viral diseases. The tomato-associated Mi-1.2 gene has been successfully deployed in tomato cultivars to attain whitefly resistance. In the current study, putative Mi-1.2-like orthologs were identified in five whitefly hosts and functionally validated through virus-inducing gene silencing (VIGS) in cotton plants. The expression profiling and qPCR results depicted differential regulation of the Mi-1.2-like gene in various tissue types and under different biotic and abiotic stresses, especially in whitefly susceptible and resistant cotton plants. The upregulation of the Mi-1.2-like gene (Gadrp RPP-13 Like gene) was observed at 24 h and 48 h post-whitefly exposure (PWFE) in whitefly resistant (FDH-228) and tolerant (Mac7) cotton plants as compared to susceptible plants of Coker-312. However, delayed expression was recorded at 72 h of PWFE in Coker-312 plants. In TRV based gene silencing experiment, silencing of the Mi-1.2-like gene, significantly enhanced the whitefly infestation on both whitefly-resistant and susceptible cotton genotypes. Based on these results, we conducted the evolutionary analysis of Mi-1.2-like orthologs among cotton, cassava, tomato, papaya, and cucumber hosts. This indicated that cotton associated Mi-1.2 like gene has a close relation with cassava and tomato. These results suggested that Mi-1.2-like R genes could be the potential candidate for deriving whitefly resistance response in cotton plants.
https://www.sciencedirect.com/science/article/pii/S0378111922008034

3. **Akram, U., Sahar, A., Sameen, A., Muhammad, N., Ahmad, M. H., Khan, M. I., ... & Rahman, H. U. U. (2023). Use of Fourier transform infrared spectroscopy and multi-variant analysis for detection of butter adulteration with vegetable oil. *International Journal of Food Properties*, *26*(1), 167-178.doi: 10.1080/10942912.2022.2158860. Hafiz Ubaid-ur-Rehman (SFAS) Date of Publication: Jan-Dec 2023 HJRS: W (Bronze)**
   During butter manufacturing, adulteration of animal and plant fats is one of the major issues in dairy industries. In dairy products, there is a huge potential in spectroscopic techniques such as Fourier transform infrared spectroscopy (FTIR) for the rapid determination of various adulterants. These spectroscopic techniques are reliable, rapid, and accurate as compared to traditional methods. Therefore, the aim of this study was to measure the potential of FTIR spectroscopy along with mathematical modeling for the detection of vegetable oil in butter samples. In this study, different levels of vegetable oil were added to the butter. FTIR spectra of different samples were collected and processed using principal component analysis (PCA) as well as partial least square (PLS) regression. PCA results postulated that 98% of the total variance was accounted by the first two principal components (PC) with a predominance of PC 1 (85%). PLS regression analysis showed values of R2 for calibration as 0.95 and R2 for validation as 0.90 which described good prediction efficiency of vegetable oil adulteration through FTIR data. The present work summarized that Fourier transform infrared spectroscopy along with multivariate analysis can be used to measure the adulteration in butter.
   https://www.tandfonline.com/doi/full/10.1080/10942912.2022.2158860

4. **Akhlaq, M., Farooq, M. U., Ali, S. W., Amir, M., Siddique, F., Javed, M. A., ... & Munir, M. M. (2023). Characterization of quinoa-wheat flour blend for the preparation of dry cake. *Food Science and Technology*, *43*.doi: 10.1590/fst.14722. Muhammad Mubashir Munir (SFAS) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
   The current study aimed at the quinoa-wheat composite flour's characterization (including total phenolics, total flavonoids, and antioxidant activity) as well as its effect on dry cake sensory quality. Findings revealed a rise in ash content, fat, protein, and crude fiber of composite-flour (0.56-1.23%, 1.13-1.76%, 10.14-11.02%, and 0.23-1.04%, respectively) with an increase of quinoa flour (5-20%). The addition of quinoa flour to the composite flour enhanced cake texture (0.26-.70 kg), but it also decreased L-value of cake crumb (55.29-50.73). Total flavonoids (56.44-59.48 mg QE/100 g) and antioxidant activity (4.66-9.76%) increased as quinoa flour was increased, whereas total phenolics (8.68-5.46 mgGAE/g) decreased. By mixing wheat flour with quinoa flour, the nutritional value of wheat flour was increased. During sensory evaluation, the cake made from composite-flour containing 10% quinoa-flour scored the highest overall acceptability. Sensory quality of last two treatments, which included 15% and 20% quinoa flour, was lower. Quinoa seeds had a better nutritional profile than wheat, with higher levels of amino acids, minerals, dietary fibers, and oil. Since wheat is a staple food in Pakistan, adding quinoa-flour would help to reduce malnutrition in Pakistan. Furthermore, no previous research on the suitability of quinoa-wheat flour for dry cake has been conducted on Pakistani wheat flour.
   https://www.scielo.br/j/cta/a/K5spW9T9zrFtwpbsdRLgfhw/

5. **Ramadhan, M. G., Khalid, N., Uemura, K., Neves, M. A., Ichikawa, S., & Nakajima, M. (2023). Efficient water removal from water-in-oil emulsions by high electric field demulsification. *Separation Science and Technology*, *58*(1), 164-174.doi: 10.1080/01496395.2022.2086882. Nauman Khalid (SFAS) Date of Publication: January 2023 HJRS: X (Clay)**
   Following hydrothermal liquefaction (HTL), microalgae bio-crude products contain approximately 5–20% water. High electric field (HEF) demulsification can separate water from settled oil based on electrostatic charge. In this study, we investigated the effect of HEF demulsification on water-in-oil (W/O) emulsions as a model bio-crude emulsion using a batch-type coalescer. Three W/O emulsions of soybean oil, medium-chain triglyceride (MCT) oil, and castor oil (10 wt% water content) were prepared and exposed to an alternating current electric field at different voltages (1000–4000 V) and frequencies (50–2000 Hz) for 1 h. Water content in castor oil samples declined to 9.6–8.6 wt% from the initial 10 wt% as the applied voltage increased at 50 Hz after 1 day storage. A noticeable difference in the remaining water in the oil occurred between samples exposed to 50 Hz and 500 Hz at 4000 V. The water content declined to 1.8 and 1.4 wt% (MCT oil); 4.3 and 1.8 wt% (soybean oil); and 8.4 and 8.1 wt% (castor oil) at 50 Hz and 500 Hz, respectively, at 4000 V. Moreover, HEF demulsification consumed negligible energy compared to centrifugation (1.37 × 103 J/kg versus 2.71 × 1010 J/kg).
   https://www.tandfonline.com/doi/full/10.1080/01496395.2022.2086882

School of Media and Communication Studies (SMCS)

1. **Ittefaq, M., Ahmad Kamboh, S., Iqbal, A., Iftikhar, U., Abwao, M., & Arif, R. (2023). Understanding public reactions to state security officials' suicide cases in online news comments. *Death Studies*, *47*(4), 499-508.doi: 10.1080/07481187.2022.2101074. Azhar Iqbal (SMCS) Date of Publication: March-April 2023 HJRS: W (Platinum)**
   Little is known about public reactions to state security officials' suicide in Muslim countries like Pakistan. To explore readers' reactions in online comments, we analyzed 1,765 comments related to 10 news stories about suicide published in five mainstream English newspapers. The findings revealed six themes: stress, depression, and mental health issues; controversial investigation reports and misinformation; need for stronger accountability to address corruption in the country; criticizing media and security institutions; sympathy for the deceased and their families; and suicide and Islam. We recommend that suicide prevention organizations should monitor audience comments to devise and suggest resources for the public.
   https://www.tandfonline.com/doi/full/10.1080/07481187.2022.2101074

2. **Ittefaq, M., Ejaz, W., Jamil, S., Iqbal, A., & Arif, R. (2021). Discriminated in society and marginalized in media: Social representation of Christian sanitary workers in Pakistan. *Journalism Practice*, 17(1), 66-84. Doi: 10.1080/17512786.2021.1939103. Azhar Iqbal (SMCS) Date of Publication: January 2023 HJRS: W (Gold)**
   Sanitary workers are globally marginalized both in media and society. Such discrimination is often amplified when such essential workers belong to a religious minority in Muslim majority societies such as Pakistan. Drawing from the frameworks of social representation and social identity theories, this study uses the qualitative method of in-depth interviews with 30 Christian sanitary workers to shed light on the perception of representation of Christian sanitary workers in Pakistan's mainstream media. Upon analyzing the data, three distinct themes emerge: (a) a lack of mainstream media representation, (b) excessive negative media representation, and (c) cognizance of the effects such representation yields. This investigation revealed that sanitary workers believe that they do not have any representation in Pakistan's mainstream media to voice their issues. Moreover, they have serious reservations about their polemic social representation and voice concerns regarding the media that often amplify such depictions. Despite being less educated, the respondents in the study appear to understand the influence of media in a democratic and multicultural society. Therefore, they expect traditional media to highlight their genuine issues (i.e., joblessness, health-related problems, and fair treatment in society), all of which, in their view, can make their life a lot easier.
   https://www.tandfonline.com/doi/full/10.1080/17512786.2021.1939103

3. **Ashraf, A., & Aslam, M. J. (2023). An Effectiveness of Online Adverts on the Purchasing Behavior and Cultural Change among University Students. *Journal of Media and Entrepreneurial Studies,* 3, 54-64. Mian Jawed Aslam (SMCS) Date of Publication: February 2023 HJRS: Y (Null)**
   This research article is an analysis of the Effectiveness of Online Adverts on Purchasing Behavior and cultural change among Students at the University of Central Punjab, Lahore, Pakistan. The main research hypothesis is, "It is perceived as online advertshelp in promoting purchasing behavioramong Students of the University of Central Punjab, Lahore." This study is conducted on a quantitative survey research design, for this purpose representative sample size of 160 undergraduate and graduate students aredrawn using a stratified sampling technique. To document and analyse the research objectives of purchasing behaviorof students and the role of online adverts in promoting new trends and glamour which resultantly become agents of social change, distinct statistical tests i.e. ANOVA and one sample t-test are used. The findings of the study reveal that there is a significant relationship between online adverts and purchasing behaviorof students moreover online adverts also promote new trends and glamour which helps in bringing and maintaining social change.
   https://jmes.pk/index.php/JMES/article/view/24/17

4. **Rehman, A., Khan, S. ., & Zia, A. (2023). Cognitive Science and Learning Environment in Rural Areas of Punjab. *Journal of Social Sciences Review,* 3(1), 222–234. https://doi.org/10.54183/jssr.v3i1.123. Anjum Zia (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**
   There is a difference in the learning environment between rural and urban areas. When compared with rural areas, urban areas are always found to have better facilities with regards to learning. When it comes to academic achievements and career development, science is the most preferred field of study. Parents and students, particularly in rural areas, have developed the belief that science is the only path to a successful future career. This study explores the cognitive sciences and learning environment in rural Punjab. For this purpose, rural areas of Punjab (Sargodha, Mianwali, and Rajanpur) have been selected. The current study implies qualitative research methods, i.e., in-depth interviews. While using the purposive sampling technique, a sample size of 12 respondents

(4 students, 4 parents, and 4 teachers) has been defined. Findings of the study reveal that students in rural Punjab are highly inclined to study science, but the study environment in rural Punjab is of the transmissive type. Students face challenges while studying science in a transmissive environment. According to one study, there is a need in rural Punjab for proper facilities that can help students study science in a more teacher-student friendly environment.
https://ojs.jssr.org.pk/index.php/jssr/article/view/123

5. **Basit, A., Zia, A. & Toor, I. S. (2023). Pakistani Private TV News Channels' Coverage to Military Operation 'Zarb-e-Azb': A Comparative Analysis of the Viewers' Perception. *Global Strategic & Security Studies Review*, VIII(I), 1-14. https://doi.org/10.31703/gsssr.2023(VIII-I).01. Abdul Basit, Anjum Zia (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**
The military operations have exacted serious effects on the socio-psychological structure of society which has led to an overall tense environment. The aim of this study was to explore the public's perspective on Pakistani private TV news channels' coverage of military operation 'Zarb-e-Azb'. The research sought to understand the public's consumption habits of this coverage, assess the extent to which it fostered a sense of national integration and examine the media's role during the operation. The results showed that the private TV news channels made an effort to portray the ground battle accurately. From the viewers' perspective, the coverage boosted the Pakistani military's morale, improved relations between civil and military groups, and fostered a sense of national unity. Furthermore, viewers believed that the operation effectively eliminated terrorism.
https://www.gsssrjournal.com/current-issue/8/1/2023

Institute of Liberal Arts (ILA)

Department of Linguistics and Communications

1. **Haroon, S., Aslam, M., & Saleem, T. (2023). Exploring the cross-linguistic functioning of the Principles of WH-Movements: The case of Pakistani ESL learners. *Cogent Arts & Humanities*, 10(1), 2174518. doi: 10.1080/23311983.2023.2174518. Sidra Haroon (DLC/ILA) Date of Publication: Jan-Dec 2023 HJRS: W (Honorable Mention)**
This is a cross-linguistic study conducted with Pakistani learners of English in the classroom setting. This study aimed to explore whether the UG Principles of WH-movement supported or restricted Urdu-speaking learners in forming direct WH-questions in English. For data collection, a sample of 260 students was selected using convenience sampling from ten (10) private and four (04) public sector secondary schools from Lahore. To address the research questions of this study, frequency data were collected through Grammaticality judgment Tasks with thirty-six (36) WH-questions in Urdu. Each Urdu sentence is followed by two English translations (T1 & T2). The statistical analysis showed that UG Principles of WH-movement were fully available to Pakistani ESL learners whose L1 was Urdu. The study has important implications for the UG researchers in that more cross-linguistic studies are needed to verify Chomsky's Hypothesized UG regarding non-English languages. The study also suggests revisiting the Critical Period Hypothesis. Besides, the teachers and materials developers of English grammar in non-native settings like Pakistan should rethink the role of direct instruction of rules and carrier content in teaching WH-questions to learners of English as a second language.
https://www.tandfonline.com/doi/full/10.1080/23311983.2023.2174518

School of Professional Psychology (SPP)

Department of Clinical Psychology

1. **Mukhtar, S. (2023). COVID-19 feminist framework and biopsychosocial-spiritual perspective for social workers and mental health practitioners to manage violence, abuse, and trauma against children, women, BIPOC, and LGBTQIA+ during and post-COVID-19. *International social work*, *66*(1), 93-106. doi: 10.1177/00208728211067158. Sonia Mukhtar (Clinical Psychology/SPP) Date of Publication: January 2023 HJRS:W (Bronze)**
This article explains the integrated implementation of a COVID-19 Feminist Framework (CFF) and biopsychosocial-spiritual perspective (BPSS-P) on the inclusive equitability of social service providers, practitioners, and policy-developers on global platforms. Mechanisms of CFF and BPSS-P entail the process to address/mitigate institutional inequities, mental health issues, violation of human rights, race/sex/gender-based violence, abuse, and trauma amid

COVID-19. This discourse is about raising consciousness, collective liberation, wellbeing, and equality for women, children, BIPOC, LGBTQIA+, and gender-diverse people. This article further discusses social workers and mental health practitioners' uniqueness for short-term and long-term support for emotional, cognitive-behavioral, and psychosocial repercussions on the individual and community levels.
https://journals.sagepub.com/doi/full/10.1177/00208728211067158#con

School of Professional Advancement (SPA)

1. **Alanazi, S. A., Shabbir, M., Alshammari, N., Alruwaili, M., Hussain, I., & Ahmad, F. (2023). Prediction of Emotional Empathy in Intelligent Agents to Facilitate Precise Social Interaction. *Applied Sciences*, *13*(2), 1163.doi: 10.3390/app13021163. Maryam Shabbir (SPA) Date of Publication: January 2023 HJRS: W (Bronze)**
The research area falls under the umbrella of affective computing and seeks to introduce intelligent agents by simulating emotions artificially and encouraging empathetic behavior in them, to foster emotional empathy in intelligent agents with the overarching objective of improving their autonomy. Raising the emotional empathy of intelligent agents to boost their autonomic behavior can increase their independence and adaptability in a socially dynamic context. As emotional intelligence is a subset of social intelligence, it is essential for successful social interaction and relationships. The purpose of this research is to develop an embedded method for analyzing empathic behavior in a socially dynamic situation. A model is proposed for inducing emotional intelligence through a deep learning technique, employing multimodal emotional cues, and triggering appropriate empathetic responses as output. There are 18 categories of emotional behavior, and each one is strongly influenced by multimodal cues such as voice, facial, and other sensory inputs. Due to the changing social context, it is difficult to classify emotional behavior and make predictions based on modest changes in multimodal cues. Robust approaches must be used to be sensitive to these minor changes. Because a one-dimensional convolutional neural network takes advantage of feature localization to minimize the parameters, it is more efficient in this exploration. The study's findings indicate that the proposed method outperforms other popular ML approaches with a maximum accuracy level of 98.98 percent when compared to currently used methods.
https://www.mdpi.com/2076-3417/13/2/1163

School of Commerce and Accountancy (SCA)

1. **Rasheed, B., Malik, Z. F., Haider, S. T. F., & Shakeel, A. (2023). Corporate Social Responsibility Disclosure and Firm's Operational, Financial and Market Performance: A Study of Content Analysis of Firms Listed at Pakistan Stock Exchange. *IRASD Journal of Economics,* 5(1), 658–670. https://doi.org/10.52131/joe.2023.0501.0106. Burhan Rasheed, Zohair Farooq Malik, Syed Taha Fraz Haider, Amer Shakeel (SCA) Date of Publication: March 2023 HJRS: Y (Null)**
Developing economies like Pakistan, still struggling to promote the emerging concept of Corporate Social Responsibility (CSR), so this research aims to investigate the impact of CSR Disclosure (CSRD) on a Firm's Performance (FP). This study is based on conceptual aspects of CSRD and is different because FP is measured with three different types of proxies, i.e. operational, financial and market performance. The empirical results of this research show the positive and significant impact of CSRD on a firm's operational and financial performance but insignificant in the case of market performance. It is further concluded that firms disclosing CSR have better operational and financial performance. This study is a pioneer to uplift the importance of CSRD in Pakistan and therefore an addition to existing literature, this paper also provides different new ways to assess the link between CSRD and FP.
https://journals.internationalrasd.org/index.php/joe/article/view/1045

2. **Ali, H. S., Jia, F., Lou, Z., & Xie, J. (2023). Effect of blockchain technology initiatives on firms' market value. *Financial Innovation,* 9(1), 48. doi: 10.1186/s40854-023-00456-8. Haji Suleman Ali (SCA) Date of Publication: February 2023 HJRS: W (Bronze)**
Despite blockchain's potential to transform corporations by providing new ways of organizing business processes and handling information, extant research pays inadequate attention to how and under what conditions blockchain technology provides additional fnancial value for shareholders. Drawing on the efcient market hypothesis and signaling theory, we examined the relationship between frms' blockchain use, development announcements, and stock market reactions. We used the event study methodology to analyze a sample of blockchain projects initiated by US frms between 2016 and 2019. The sample contains 114 frm-event observations. The fndings show that the average abnormal return over a 2 days event period (including the day of the announcement and the day after the

announcement) was positive. This positive stock market reaction is even more substantial when frms announce blockchain projects that focus on saving cost or time. Our fndings also indicate that blockchain announcements tend to elicit more positive market reactions from smaller frms. We analyzed 249 frm-event observations containing frms from around the world and conclude that blockchain technology has a non-signifcant long-term impact on operating performance. The contingency approach adopted in our research provides advice for selecting the right mix of blockchain investment initiatives that is most suitable for a given organizational context.
https://link.springer.com/article/10.1186/s40854-023-00456-8

UMOs

Office of Research Innovation and Commercialization (ORIC)

1. **Agwu, I. K., Ishtiaq, U., Saleem, N., Igbokwe, D. I., & Jarad, F. (2023). Equivalence of novel IH-implicit fixed point algorithms for a general class of contractive maps. *AIMS Mathematics,* 8(1), 841-872. doi: 10.3934/math.2023041. Umar Ishtiaq (ORIC) Naeem Saleem (Mathematics\SSC) Date of Publications: January 2023 HJRS: W (Honorable Mention)**
In this paper, a novel implicit IH-multistep fixed point algorithm and convergence result for a general class of contractive maps is introduced without any imposition of the "sum conditions" on the countably finite family of the iteration parameters. Furthermore, it is shown that the convergence of the proposed iteration scheme is equivalent to some other implicit IH-type iterative schemes (e.g., implicit IH-Noor, implicit IH-Ishikawa and implicit IH-Mann) for the same class of maps. Also, some numerical examples are given to illustrate that the equivalence is true. Our results complement, improve and unify several equivalent results recently announced in literature.
http://www.aimspress.com/article/doi/10.3934/math.2023041

2. **Ishtiaq, U., Khaleel Ahmad, Asjad, M. I., Ali, F., & Jarad, F. (2023). Common fixed point, Baire's and Cantor's theorems in neutrosophic 2-metric spaces. *AIMS Mathematics*, *8*(2), 2532-2555.doi: 10.3934/math.2023131.doi: 10.3934/math.2023131. Umar Ishtiaq (ORIC) Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
These fundamental Theorems of classical analysis, namely Baire's Theorem and Cantor's Intersection Theorem in the context of Neutrosophic 2-metric spaces, are demonstrated in this article. Naschie discussed high energy physics in relation to the Baire's Theorem and the Cantor space in descriptive set theory. We describe, how to demonstrate the validity and uniqueness of the common fixed-point theorem for four mappings in Neutrosophic 2-metric spaces.
http://www.aimspress.com/article/doi/10.3934/math.2023131

3. **Ishtiaq, U., Asif, M., Hussain, A., Ahmad, K., Saleem, I., & Al Sulami, H. (2023). Extension of a Unique Solution in Generalized Neutrosophic Cone Metric Spaces. *Symmetry*, *15*(1), 94.doi: 10.3390/sym15010094. Umar Ishtiaq (ORIC) Date of Publications: January 2023 HJRS: W (Bronze)**
In order to solve issues that arise in various branches of mathematical analysis, such as split feasibility problems, variational inequality problems, nonlinear optimization issues, equilibrium problems, complementarity issues, selection and matching problems, and issues proving the existence of solutions to integral and differential equations, fixed point theory provides vital tools. In this study, we discuss topological structure and several fixed-point theorems in the context of generalized neutrosophic cone metric spaces. In these spaces, the symmetric properties play an important role. We examine the existence and a uniqueness of a solution by utilizing new types of contraction mappings under some circumstances. We provide an example in which we show the existence and a uniqueness of a solution by utilizing our main result. These results are more generalized in the existing literature.
https://www.mdpi.com/2073-8994/15/1/94

4. **Naveed, M. A., Iqbal, J., Asghar, M. Z., Shaukat, R., & Seitamaa-Hakkarainen, P. (2023). Information Literacy as a Predictor of Work Performance: The Mediating Role of Lifelong Learning and Creativity. *Behavioral Sciences*, *13*(1), 24.doi: 10.3390/bs13010024. Muhammad Zaheer Asghar, Rozeen Shoukat (ORIC) Date of Publications: January 2023 HJRS: W (Bronze)**
This study examined the effect of information literacy (IL) on work performance with mediating role of lifelong learning and creativity among journalists in Pakistan. A cross-sectional survey using an online questionnaire was conducted in the press clubs of four provinces (e.g., Punjab, Sindh, Khyber Pakhtunkhwa, and Baluchistan) and the federal capital Islamabad for data collection. The received 1084 responses were analyzed using the partial least squares structural equation modelling. The results indicated that IL of journalists had a direct and indirect but

positive influence on their work performance. The lifelong learning and creativity skills also mediated the relationship between IL and work performance. This study provided empirical evidence for how IL directly influence work performance and indirectly with the mediated role of lifelong learning and creativity. These pragmatic insights may inform academicians and enterprises about the IL importance at workplace for enhancement of organizational performance and achieving a competitive advantage. Such results may also initiate an instruction program for existing as well as for prospective journalists to impart IL education. This study could be a worthy contribution to the existing IL research in the workplace context in general and of journalists' workplace in particular as no such study has appeared so far.
https://www.mdpi.com/2076-328X/13/1/24

5. **Din, F. U., Din, M., Ishtiaq, U., & Sessa, S. (2023). Perov Fixed-Point Results on F-Contraction Mappings Equipped with Binary Relation. *Mathematics*, *11*(1), 238.doi: 10.3390/math11010238. Umar Ishtiaq (ORIC) Date of Publications: January 2023 HJRS: W (Bronze)**
The purpose of this article is to discuss some new aspects of the vector-valued metric space. The idea of an arbitrary binary relation along with the well-known F contraction is used to demonstrate the existence of fixed points in the context of a complete vector-valued metric space for both single- and multi-valued mappings. Utilizing the idea of binary relation, and with the help of F contraction, this work extends and complements some of the very recently established Perov-type fixed-point results in the literature. Furthermore, this work includes examples to justify the validity of the given results. During the discussion, it was found that some of the renowned metrical results proven by several authors using different binary relations, such as partial order, pre-order, transitive relation, tolerance, strict order and symmetric closure, can be weakened by using an arbitrary binary relation.
https://www.mdpi.com/2227-7390/11/1/238

UMT Sialkot Campus

Knowledge Unit of Systems and Technology

Department of Computer Sciences

1) **Cheema, S. M., Tariq, S., & Pires, I. M. (2023). A natural language interface for automatic generation of data flow diagram using web extraction techniques. *Journal of King Saud University - Computer and Information Sciences,* 35(2), 626-640. doi: https://doi.org/10.1016/j.jksuci.2023.01.006. Sehrish Munawar Cheema, Saman Tariq (Computer Science/KUST) Date of publication: February 2023 HJRS: W (Silver)**
To model the data and functions in various computer science applications, the researcher uses a Data Flow Diagram (DFD). DFD has been constructed using [open-source software tools that provide users with different shapes and environments. However, the existing approaches require substantial human effort, the validity of the generated output is still a loophole, and they have never gained traction in practice. Our research objective is to develop a semi-automated tool for drawing complex Data Flow Diagrams in the shortest time according to the specified features of the intended system. We developed a Natural Language Interface (NLI) that allows the user to compose a query and identify the system functionality and constraints for the composition of DFD. Natural Language Processing (NLP) techniques are applied to scrapped data to extract the keywords and develop a data repository. Also, we developed rule-based algorithms to map user queries onto respective token shapes to draw the required functionality into appropriate levels of DFD. For verification, output DFDs were converted into conceptual digraphs using adjacency and permutation matrices to evaluate isomorphism. The empirical results reflect that the DFDs generated by the system are correct, complete, and significant.
https://www.sciencedirect.com/science/article/pii/S131915782300006X

Knowledge Unit of Science

Department of Biotechnology

1) **Irshad, A., Tahir, A., Sharif, S., Khalid, A., Ali, S., Naz, A., Amin, A., ... & Ameen, A. (2023). Determination of Nutritional and Biochemical Composition of Selected Pleurotus spps. *BioMed Research International*, *2023*. 815090. doi: 10.1155/2023/8150909. Sajed Ali (Biotechnology/KUSC) Alisha Naz (Life Sciences/SSC) Ayesha Amin (ORIC) Date of publication: January 2023 HJRS: W (Honorable Mention)**

The global demand for good quality food is going to be increased gradually. Mushrooms are broadly used as healthy nutritious meals. The nutritional values of extracts from four distinct Pleurotus species - Pleurotus ostreatus, Pleurotus sajor-caju, Pleurotus sapidus, and Pleurotus columbinus - were determined in the current study. Firstly, proximate analysis of selected Pleurotus species was performed followed by the Bradford assay to analyze the protein spectrophotometrically; high-performance liquid chromatography (HPLC) was performed for sugar determination while GC-MS was done to determine fatty acids on organic extracts of selected mushrooms. Descriptive statistics were used to calculate the percentages while significance was determined by SPSS statistics. The results depicted that fat, protein, ash, fiber, energy contents, and total carbohydrate were in the range of 0.64-2.02%, 16.07-25.15%, 2.1-9.14%, 6.21-54.12%, 342.20-394.30 kcal/100 g, and 65.66-82.47%, respectively. The protein's maximum concentration was observed in P. ostreatus followed by P. columbinus>P. sajor-caju>P. sapidus, sequentially. Various sugars may or may not be present in selected Pleurotus spps. Among the fatty acids, the prevalence of UFA was more than that of saturated fatty acids among all selected mushrooms. From this study, it is concluded that all four Pleurotus spps. have excellent nutritional composition and can be used as valuable food and a great source of biochemical compounds.
https://www.hindawi.com/journals/bmri/2023/8150909/

Department of Mathematics

1. **Saleem, M., & Hussain, M. (2023). Impression of nonlinear radiation and Stefan blowing on the magneto cross nano-Williamson fluid above exponentially stretching sheet. *Results in Engineering*, *17*, 100864. doi: 10.1016/j.rineng.2022.100864. Musharafa Saleem (Mathematics/KUSC) Date of Publications: March 2023 HJRS: X (Clay)**
In order to investigate the impacts of mixed convection, electromagnetic force, and nonlinear thermal radiation on the nano-Williamson fluid (NWF) (Williamson fluid as a base fluid with nanoparticles) on an exponential stretched surface placed in a porous medium, this work considers the effects of both heat absorption-generation and Joule heating. However, consideration is also given to Stefan blowing in combination with Brownian motion and thermophoresis factors. By using similarity transformations and non-dimensional variables, the set of non-linear partial differential equations (PDEs) leading the study of fluid flow is converted into a system of ordinary differential equations (ODEs), which then numerically solved by the bvp4c built in MATLAB package. Additionally, the effects of the acquired relevant factors on the distributions of velocity, nanoparticles-concentration, and temperature have been investigated through graphical arrangements in order to give each parameter a physical meaning. The comparative values of skin friction and Nusselt number for dissimilar values of and (Stefan blowing cases) are tabulated in Table 1, Table 2, Table 3, Table 4 respectively.
https://www.sciencedirect.com/science/article/pii/S2590123022005345

2. **Liu, J. B., Ali, H., Shafiq, M. K., Dustigeer, G., & Ali, P. (2021). On topological properties of planar octahedron networks. *Polycyclic Aromatic Compounds,* 43(1), 755-771.doi: 10.1080/10406638.2021.2022726. Muhammad Kashif Shafiq (Mathematics/KUSC) Date of Publication: January 2023 HJRS: X (Null)**
In the research of QSAR and QSPR correlations, topological indices such as the Randi'c index, Zagreb index, ABC index, and geometric-arithmetic index have been proposed to analyze bio-compatibility of chemical compounds. Chemical graph theory is the combination of Chemistry and Graph theory, and this theory deals with the topology such as the mathematical study of isomerism and the development of topological indices which has applications in QSAR and QSPR. In this article, we consider the Octahedron networks and find out the above mentioned degree based topological indices.
https://www.tandfonline.com/doi/full/10.1080/10406638.2021.2022726

Department of Chemistry

1) **Aziz, T., Nasim, H. A., Ahmad, K., Parveen, S., Ahmad, M. M., Majeed, H., ... & Ashfaq, M. (2023). Rational synthesis, biological screening of azo derivatives of chloro-phenylcarbonyl diazenyl hydroxy dipyrimidines/thioxotetrahydropyrimidines and their metal complexes. *Heliyon*, *9*(1).doi: 10.1016/j.heliyon.2022.e12492. Khalil Ahmad, Hammad Majeed (Chemistry/KUSC) Date of publication: January 2023 HJRS: W (Silver)**
Herein, a new series of azo ligands HL-1 (5-(2-chloro-6-(phenylcarbonyl)phenyl)diazenyl)-6-hydroxydihydropyrimidines-2,4dione), HL-2 (5-(2-chloro-6-(phenylcarbonyl)phenyl)diazenyl)-6-hydroxy-2-thioxottetrahydropyrimidin-4one), HL-3 (5-(2,4-dichloro-6-(phenylcarbonyl)phenyl) diazenyl)-6-

hydroxydihydropyrimidines-2,4dione), HL-4 (5-(2,4-dichloro-6-(phenylcarbonyl) phenyl)diazenyl)-6-hydroxy-2-thioxotetrahydropyrimidin-4one) and their metal complexes with Cu(II) & Ni(II) were synthesized successfully having excellent yield, in reproducible conditions and for structure elucidation different advance spectroscopic techniques (FTIR, 1H NMR, 13C NMR and Mass Spectrometry) were applied. In FTIR analysis, the absence of peak at 3450-3550 cm-1 due to –NH2 and presence of a new peak of N=N at 1390-1520 cm−1 confirmed synthesis of the ligands. The 1H NMR spectra of azo ligands showed singlet peak at 11.5–13.5 ppm (Ar-OH) for hydroxyl group and –NH2 signals disappearance of anilines at 4–5 ppm also gives strong indication for the synthesis of azo compounds. On complexation two most important peaks (M-O, M-N) appeared in all the metal chelates in the range of 400–600 cm−1 which were not present in any of the ligands, confirmed the formation of complexes. Molecular ion peaks in mass spectra at 273, 388, 407 and 423 m/z value for ligands as well as for complexes at 803, 835, 871 and 904 m/z also give strong indication that proposed ligands and their metal complexes are produced successfully. Biological screening of the synthesized compounds were also carried out against different bacterial strains (E.coli, S.typhi, and B.subtilis), antifungal (C.albicans, A.niger, and C.glabrata) strains and antioxidant activity. From results it was observed that HL-4 and Cu complexes exhibited maximum inhibition against all bacterial and fungal strains as compared to other ligands and standard drug.
https://www.sciencedirect.com/science/article/pii/S240584402203780X

Knowledge Unit of Engineering

Department of Electrical Engineering

1) **Hussain, I., Haider, A., Ullah, Z., Russo, M., Casolino, G. M., & Azeem, B. (2023). Comparative Analysis of Eight Numerical Methods Using Weibull Distribution to Estimate Wind Power Density for Coastal Areas in Pakistan. *Energies,* 16(3), 1515. Iqrar Hussain, Aun Haider, Zahid Ullah (Electrical Engineering/KUEN) Date of publication: February 2023 HJRS: W (Bronze)**
Currently, Pakistan is facing severe energy crises and global warming effects. Hence, there is an urgent need to utilize renewable energy generation. In this context, Pakistan possesses massive wind energy potential across the coastal areas. This paper investigates and numerically analyzes coastal areas' wind power density potential. Eight different state-of-the-art numerical methods, namely an (a) empirical method, (b) graphical method, (c) wasp algorithm, (d) energy pattern method, (e) moment method, (f) maximum likelihood method, (g) energy trend method, and (h) least-squares regression method, were analyzed to calculate Weibull parameters. We computed Weibull shape parameters (WSP) and Weibull scale parameters (WCP) for four regions: Jiwani, Gwadar, Pasni, and Ormara in Pakistan. These Weibull parameters from the above-mentioned numerical methods were analyzed and compared to find an optimal numerical method for the coastal areas of Pakistan. Further, the following statistical indicators were used to compare the efficiency of the above numerical methods: (i) analysis of variance (R2$\square$2), (ii) chi-square (X2$\square$2), and (iii) root mean square error (RMSE). The performance validation showed that the energy trend and graphical method provided weak performance for the observed period for four coastal regions of Pakistan. Further, we observed that Ormara is the best and Jiwani is the worst area for wind power generation using comparative analyses for actual and estimated data of wind power density from four regions of Pakistan.
https://www.mdpi.com/1996-1073/16/3/1515

2) **Awan, M. M. A., Asghar, A. B., Javed, M. Y., & Conka, Z. (2023). Ordering Technique for the Maximum Power Point Tracking of an Islanded Solar Photovoltaic System. *Sustainability,* 15(4), 3332. Muhammad Mateen Afzal Awan (Electrical Engineering/KUEN) Date of publication: February 2023 HJRS: W (Bronze)**
The world's attention has turned towards renewable energy due to escalating energy demands, declining fossil fuel reservoirs, greenhouse gas emissions, and the unreliability of conventional energy systems. The sun is the only renewable energy source that is available every day for a specific period of time. Solar photovoltaic (PV) technology is known for its direct conversion of sunlight into electricity using the photoelectric effect. However, due to the non-linear electrical characteristics, the power output of solar PV cells is bound to a lower value and can not produce the power of which it is capable. To extract the maximum possible power, the PV cell needs to be operated at its maximum power point (MPP) uninterruptedly under numerous weather conditions. Therefore, an electronic circuit driven by a set of rules known as an algorithm is utilized. To date, the flower pollination algorithm (FPA) is one of the most renowned maximum power point tracking (MPPT) algorithms due to its effective tracking ability at the local and global positions. After an in-depth analysis of the design, strengths, weaknesses, and opportunities of the FPA algorithm, we have proposed an additional filtration and distribution process named "Random walk" along with the ordering of solutions, to improve its efficiency and tracking time. The proposed structure named "Ordered FPA"

has outperformed the renowned FPA algorithm under various weather conditions at all the standard benchmarks. Simulations are performed in MATLAB/Simulink.
https://www.mdpi.com/2071-1050/15/4/3332

Knowledge Unit of Commerce and Accountancy

1) **Iram, T., Bilal, A. R., Ahmad, Z., & Latif, S. (2023). Does Financial Mindfulness Make a Difference? A Nexus of Financial Literacy and Behavioural Biases in Women Entrepreneurs. *IIM Kozhikode Society & Management Review*, *12*(1), 7-21.doi: 10.1177/22779752221097194. Shahid Latif (kUCA) Date of publication: January 2023 HJRS: Y (Null)**
This article aims to determine the intervening strength of financial mindfulness between financial literacy and behavioural biases in women entrepreneurs. The literature has an enduring discussion regarding the profoundly unique financial behaviour of women. Financial literacy and behavioural biases constitute a recurrent research topic, yet how this nexus exists in the premise of women's entrepreneurship is not well known. Building on this gap, we examined the impact of financial literacy on women entrepreneurs' behavioural biases by focusing on financial mindfulness as a potential moderator. A random sample of 346 women entrepreneurs operating in Pakistan was analysed using structural equation modelling through AMOS 21. The results revealed a significant direct impact of financial literacy on reducing anchoring and herding bias; however, financial literacy was found to be unrelated to mental accounting bias. The moderation analysis further revealed interesting indirect impacts, such that financial literacy strongly reduced mental accounting and herding bias for financially mindful women. Nonetheless, financial mindfulness does not negatively catalyse the relationship between financial literacy and anchoring bias. By encompassing the concepts of financial literacy, mindfulness and behavioural biases, we offer a unique theoretical strand with practical implications for women entrepreneurs. We suggest new avenues for the longstanding dilemma related to the factors instigating suboptimal financial decision-making in women entrepreneurs in developing markets.
https://journals.sagepub.com/doi/abs/10.1177/22779752221097194?journalCode=ksma

Knowledge Unit of Business, Economics, Accountancy and Commerce (KUBEAC)

1. **Liu, S., Junaid, M., Sadaf, M., Ai, W., Lan, X., & Wang, J. (2023). A novel framework-based meta-analysis for in-depth characterization of microplastic pollution and associated ecological risks in Chinese Bays. *Journal of Hazardous Materials*, *444*, 130423.doi: 10.1016/j.jhazmat.2022.130423. Mamona Sadaf (Economics/KUBEAC) Date of publication: February 2023 HJRS: W (Platinum)**
Among aquatic ecosystems, bays are ubiquitously contaminated with microplastics (MPs, size <5 mm), but a comprehensive understanding of their pollution characterization in Chinese Bays is largely elusive. The current study aims to systematically highlight factors intricating MP contamination as well as their geographic distribution, interactions, risk evaluation, and abundance prediction in bays. MPs' abundance was varied in different bays, at concentrations ranging between 0.26 ± 0.14–89, 500 ± 20, 600 items/m3 in water, 15 ± 6–6433.5 items/kg dry weight in sediment and 0.21 ± 0.10–103.5 items/individual in biota. Redundancy analysis, Permannova, and GeoDetector model revealed that the sampling and extraction/identification methods, and geographical locations were the major drivers affecting MP distribution and characteristics. The Mantel test highlighted that the MP characteristics changed with geographic distance, higher in water than that in sediment and biota. ANOSIM results showed that the different environmental media exhibit significant differences in MP characteristics (e.g., color, shape, and polymer). The ARIMA model predicted that Sanggou Bay and Hangzhou Bay have a higher potential for significantly increasing MP contamination in the future. The highest hazard index (HI) values for water, sediment, and biota were respectively reported at Jiaozhou Bay (18,844.16), Bohai Bay (11,485.37), and Dongshan Bay (48,485.11). The highest values for the ecological risk index (RI) in water, sediment, and biota were detected at Beibu Gulf (6,129,559.02), Haikou Bay (2229.14), and Dongshan Bay (561,563.05), respectively. Overall, this framework can be used at different scales and in different environments, which makes it useful for understanding and controlling MP pollution in the ecosystem.
https://www.sciencedirect.com/science/article/pii/S0304389422022178 3

2. **Yihua, W., Meng, F., Farrukh, M., Raza, A., & Alam, I. (2023). Twelve years of research in The International Journal of Islamic and Middle Eastern Finance and Management: a bibliometric analysis. *International Journal of Islamic and Middle Eastern Finance and Management*, 16(1), 154-174. doi; 10.1108/IMEFM-03-2020-0134. Ali Raza (Marketing/KUBEAC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**

Purpose: This study aims to analyze the International Journal of Islamic and Middle Eastern Finance and Management (IMEFM) publication structure based on broad criteria including citations, authors, institutions, countries, papers and keywords using the Scopus database over a period of 12 years. Design/methodology/approach: In this paper, the bibliometric technique is used to analyze the advancement of IMEFM. Bibliometrics is a research field of library and information science that studies bibliographic material with quantitative methods. Findings: The results show a steady increase in the citation and publication structure of the IMEFM. That reflects its developing stature as a key academic outlet. The journal is advancing knowledge in Islamic finance and management research.Practical implications: This study presents a macro view of the journey of IMEFM over the past 12 years. That presents the audience with an opportunity to understand the trend and focus of the journal. Originality/value; Bibliometric analysis contributed to the theoretical development of the IMEFM journal in the following ways. First, it describes the evolution and intellectual structure by identifying and classifying the most common themes in the journal. More specifically, this analysis underscores two important milestones: IMEFM has emerged as a robust academic outlet, and its comprehensive focus on Islamic finance and other related areas. Furthermore, the bibliometric analysis of IMEFM's citations and knowledge stock pattern summarizes the scientific community contributing to its evolution and development. Finally, this study's results offer future research directions.
https://www.emerald.com/insight/content/doi/10.1108/IMEFM-03-2020-0134/full/html

3. **Farrukh, M., Raza, A., & Waheed, A. (2023). Your network is your net worth: political ties and innovation performance. *European Journal of Innovation Management*, *26*(1), 256-264. doi: 10.1108/EJIM-04-2021-0174. Ali Raza (Marketing/KUBEAC) Abdul Waheed (Marketing/HSM) Date of Publication: January 2023 HJRS: W (Bronze)**

Purpose – Based on the social network theory, this study investigates the impact of political ties on innovation performance. Besides, this study also tests a mediation role of absorptive capacity (AC) and a moderation role of technology turbulence. Design/methodology/approach – A hypothetico-deductive approach is adopted to test the hypotheses. Data were collected from the small and medium enterprises (SMEs) managers/owners through a structured questionnaire. Findings – Partial least square structural equation modeling technique is used to analyze the hypothesized relationships; the findings showed that political ties significantly impact the innovation performance, and this relationship is mediated by AC. Moreover, technological turbulence moderated the relationship between political ties and innovation performance. Originality/value – Despite the increasing attention to the role of networking in improving innovation, there is a scarcity of studies on the role of political ties, AC and technology turbulence in fostering organizational innovation; thus, this study is a unique contribution to literature.
https://www.emerald.com/insight/content/doi/10.1108/EJIM-04-2021-0174/full/html

School-Wise number of publications

Name of School/Department	W Category	X Category	Y Category	Total no of Publications
School of Sciences				
Department of Mathematics	32	12	-	44
Department of Chemistry	11	2	-	13
Department of Life Sciences	6	5	-	11
Department of Physics	2	2	-	4
Total	**51**	**21**	**-**	**72**
Dr. Hasan Murad School of Management				
Department of Banking and Finance	1	-	1	2
Department of Economics and Statistics	3	1	-	4
Department of Quantitative Method	-	1	-	1
Department of Management	1	-	-	1
Department of Marketing	1	-	1	2
Total	**6**	**2**	**2**	**10**
School of Systems & Technology (SST)				
Department of Computer Science	4	2	-	6
Department of Informatics and System	1	2	-	3
Department of Software Engineering	-	1	-	1
Total	**5**	**5**	**-**	**10**
School of Engineering (SEN)				
Department of Civil Engineering	1	1	-	2
Department of Industrial Engineering	2	-	-	2
Department of Electrical Engineering	3	-	-	3
Department of Mechanical Engineering	1	-	-	1
Total	**7**	**1**	**-**	**8**
School of Social Science & Humanities (SSSH)				
Department of Education	2	-	1	3
Department of Islamic Thoughts and Civilization	1	-	-	1
Total	**3**	**-**	**1**	**4**
School of Design and Textile (SDT)	**1**	**3**	**-**	**4**
School of Food & Agriculture Sciences	**4**	**1**	**-**	**5**

School of Media & Communication Studies	**3**	**-**	**2**	**5**
Institute of Liberal Arts (ILA)				
Department of Linguistics and Communications	1	-	-	1
Total	**1**	**-**	**-**	**1**
School of Professional Psychology (SPP)				
Department of Clinical Psychology	1	-	-	1
Total	**1**	**-**	**-**	**1**
School of Professional Advancement	**1**	**-**	**-**	**1**
School of Commerce and Accountancy	**1**	**-**	**1**	**2**
Office of Research Innovation and Commercialization (ORIC)	**5**	**-**	**-**	**5**
Total	**89**	**33**	**6**	**128**

UMT Sialkot Campus

School-Wise number of publications

Name of School/Department	W Category	X Category	Y Category	Total no of Publications
Knowledge Unit of Systems and Technology				
Department of Computer Sciences	1	-	-	1
Total	1	-	-	1
Knowledge Unit of Science				
Department of Biotechnology	1	-	-	1
Department of Mathematics	-	2	-	2
Department of Chemistry	1	-	-	1
Total	2	2		4
Knowledge Unit of Engineering				
Department of Electrical Engineering	2	-	-	2
Total	2	-	-	2
Knowledge Unit of Commerce and Accountancy	-	-	1	1
Knowledge Unit of Business, Economics, Accountancy and Commerce (KUBEAC)	3	-	-	3
Total	8	2	1	11