Refresher Course On

"Non-linear Analysis for the Development of Neural Network Systems"

(Date from 13th September to 25th September, 2021)

Organized by UGC-HRDC and Department of Mathematics, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.) 495 009

Introduction:

Non-linear analysis is an area of mathematics which has grown up over the past few decades, influenced by nonlinear problems occurring in physics, biology, computer science, mechanics and economics. Its scope is far away and is much wider than that of the linear system study as most of problems arising in natural sciences or social sciences are not necessarily linear. It is also observed that in dealing with real world problems decision making plays a vital role and especially the uncertainty and fuzziness of real world renders problems too difficult to handle.

A neural system is a network or circuit of neurons. An artificial neural network is composed of artificial neurons(processing elements) obtained by mimicking the natural biological system. A variety of applications arise from several interdisciplinary domains that involve function approximation, regression analysis, sequential decision making and non-linear system identification. In the application of neural networks either as associative memories or as optimization solvers, the stability of networks is of paramount interest. Especially, when neural networks are employed as associative memories, the equilibrium points represent the stored patterns, and, the stability of each equilibrium point ensures that each stored pattern can be retrieved even in the presence of noise. When employed as an optimization solver, the equilibrium points of neural networks correspond to feasible optimal solutions, and the stability of the network then ensures the convergence to optimal solutions. Also, it is well known that studies on neural networks not only involve discussions of stability properties of equilibrium points, but also prompt the investigations of other dynamical behaviours such as periodic oscillations, bifurcations and chaos. In many applications, knowing the property of periodic oscillatory solutions is very interesting and valuable. For example, the human brain is often in periodic oscillatory or chaotic state, hence it is of prime importance to study periodic oscillatory and chaotic phenomenon of neural networks for understanding the function of the human brain. In this connection the use of fixed-point theory, fuzzy neutrosophic soft mappings and some non-linear analysis methodologies such as Lyapunav functions and others play an impeccable role.

The main purpose of the proposed refresher course cum training programme is to provide an adequate knowledge and understanding of the role of nonlinear analysis in dealing with the neural network systems and real world problems subject to uncertainty and fuzziness.

Objectives:

The Refresher Course Will Enable To:

- Gain adequate understanding of the tools of nonlinear analysis in dealing with the neural systems arising in real world problems;.
- Develop the much needed mindset for mathematicians to contribute to the development of intelligent machines aimed at bettering the lives of the mankind;
- Equip the mathematicians working on application domains in minimizing the role of heuristics by paving way for the design and development of robust machines.

Modules of Course:

The course will be organized under modules as follows:

(1) Basic concepts and auxiliary topics on function spaces and operators needed for setting the analysis background.

(2) Fixed point theorems and applications to operator equations defined in appropriate function spaces. Constructive methods and the related numerics (iterative schemes and algorithms) .

(3) Topics in artificial neural system study following dynamical system approach, connection between biological and artificial neural systems, applications dealing with images and data related systems.

About Human Resource Development Centre (HRDC):

UGC-Academic Staff College (ASC), presently upgraded as Human Resource Development Centre (HRDC) was initially established in Guru Ghasidas Vishwavidyalaya (a Central University) during 2009. HRDC is organising various kinds of training programmes to enhance the professional skills and knowledge of teaching and non-teaching staff. The HRDC has the state of the art ICT Laboratory equipped with high speed internet & video conferencing facilities. The facilities of Central Library of Vishwavidyalaya, equipped with more than one lakh books and journals, Science Direct and INFLIB NET, have been extended to HRDC, which make possible an easy access to books, journals and e-resources for faculties. The HDRC has developed strong linkages with reputed national and international institutes

and invites eminent academicians and researchers as resource persons as per the needs of the training programmes. The highly motivated faculty, eminent resource persons, state of the art facilities and excellent logistics are the strengths of HRDC and key to the successful organisation of many quality programmes.

About Department of Mathematics:

The Department started functioning in the year 1989 and is gradually emerging as an excellent centre for Research and Teaching in the areas of Mathematical Modeling, Algebra, General Topology, Analysis, Fixed point theory, Approximation Theory, Fuzzy Logic and Applications etc. under the active guidance of dedicated faculty members. Our Faculty Members have delivered invited talks and presented research papers in many Indian and foreign universities so far. Eminent Mathematicians from many premier Indian institutions visited our Department and delivered their innovative and interactive talks with the students and faculty members. The Department is going to introduce new courses in the field of mathematics and applicable mathematics to stand in the front line curriculum of the other Central Universities of the Country. The Faculty Members of the Department has the good record to have collaborative/interactive research work with many eminent Mathematicians. The members of the Department are also Members of various Editorial board/Reviewers/Referees of many National as well as International Mathematical Journals. Our M.Sc. students qualified GATE/NET examinations with good score. Our M.Phil. students have got almost cent percent placements.

Eligibility and Application of Participants:

1. The teachers who belong to Indian University/Colleges are eligible to apply for the course.
2. University/ College teachers those already attended orientation programme or Refresher Course are eligible to attend a Refresher Course after a minimum gap of one year.
3. Selection will be made as per the guidelines of the UGC-HRDC and on first come first serve basis.
4. **The last date of receiving application is 30th August 2021.**

The interested candidates are advised to apply via online application form at the earliest and the same application may be printed out for applying through proper channel from university web site: **www.ggu.ac.in/hrdc** (http://www.hrdcggv.in/RegistrationForm.aspx) with a registration fee (non-refundable) of Rs. 1000/- paid through NEFT/RTGS/NET BANKING/OTHER in the account of UGC-HRDC, GGV, Bilaspur (C.G.), Bank Account No.-947410110001547, IFSC Code- BKID0009474, Branch-BOI, GGV Campus, Koni to secure the participation. Regarding any further queries related to the course and other details, please contact the Course Coordinator and Director.

Contact:

Dr Dhananjay Gopal
Course Coordinator
Email:
nonlinearanalysis2021@gmail.com
Mob. +919375941619

Dr. J. P. Jaiswal
Course Coordinator
Mob. +9009119349

Dr. Ratnesh Singh Director (I/C)
HRDC, GGV, Bilaspur (CG)
Email:directorhrdcggv@gmail.com
Tel.No:07752-260435, 260467
Mob: 098262-00372