

Recent Trends in Metrical Fixed Point Theory and Applications

(November 25 – 29, 2024)

Overview

Fixed Point Theory, in general, and Metrical Fixed Point Theory, in particular, offers one of the most powerful tools of nonlinear functional analysis. By means of a metrical fixed point theorem one can establish the existence and uniqueness of solutions of differential and integralequations and many other nonlinear problems that can be formulated as a fixed point problem (e.g., problems in control theory, convex optimization, differential inclusions, and economics).

The fundamental theorem in metrical fixed point theory is the contraction mapping principle due to Banach, which has laid the foundation of metric fixed point theory for contraction mappings on a complete metric space.

Objectives:

The primary objectives of this course are as follows:

1. Cover the basic fundamentals of Metrical Fixed Point Theory.
2. Expose some important fixed point theorems in Metrical Fixed Point Theory.
3. Indicate some basic applications of Metrical Fixed Point Theory in nonlinear analysis.
4. To foster the knowledge for evaluating and implementing the wide range of emerging and newly adopted methodologies and technologies in the field of Nonlinear Functional Analysis and in particular Metric Fixed Point Theory and Applications.
5. Fixed Point Theorems related to Cyclic Contraction Mappings, Schauder Fixed Point Theorem and some related fixed point theorems involving Multi - Valued Mappings. Some Applications of the theorems mentioned above.
6. Browder - Gohde - Kirk Fixed Point Theorem of nonexpansive mappings and somerelated open problems in fixed point theorems related to nonexpansive mappings. Best Proximity Point Theorems and their Applications to Game Theory.
7. Expose students to current technologies and issues that are specific To Fixed Point Theory and Applications by using MATLAB (if time permits).

8. Learn the basics of Python programming, including the use of mathematical libraries also few apps for graph sketching to enhance concept comprehension.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Modules	<p style="text-align: center;">Recent Trends in Metrical Fixed Point Theory and Applications November 25 - 29, 2024</p> <p>A: Metric spaces, normed spaces, Banach spaces B: Basic metrical fixed-point theorems. C: Fixed point iterative methods contractive type mappings. D: Fixed point theorems for enriched contractions in Banach spaces E: Some applications of metrical fixed-point theory to solving nonlinear functional equations. F: Error Analysis of Fixed-Point Iteration Procedures</p> <p style="text-align: center;">Number of participants for the course will be limited to fifty (50).</p>
You Should Attend If...	<ul style="list-style-type: none"> ▪ You are a post-graduate with interest in Functional Analysis as well as General Topology. ▪ You are a research scholar and working in the area of Fixed Point Theory and Applications. Also interested to learn application of FPT in Probabilistic Metric spaces. ▪ You are a student or faculty from academic institution interested in learning how to do research in Fixed Point Theory and Applications in Fuzzy Metric spaces as well as to know Fuzzy structures. ▪ Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories. ▪ Students at all levels (B. Tech/M.Sc./M.Tech./PhD) or Faculty from reputed academic institutions and technical institutions.
Fees	<p>The participation fees for taking the course is as follows:</p> <p>Participants from abroad : \$100 (Online link will be provided)</p> <p>Industry/ Research Organizations: Rs. 4500 Academic Institutions: Rs. 3500 Students: Rs. 1000</p> <p>The above fee includes all instructional materials, working lunch, coffee on breaks, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility. The participants will be provided accommodation on shared basis on request. Fee payment will be online mode only. Bank Account Details: State Bank of India, A/C No. No. 37137162271, IFSC: SBIN0018879, Account Name: REG GURU GHASIDAS UNI BILASPUR. Registration and other course related details will be given in the Departmental portal of our university website (www.ggu.ac.in). Google Form for Registration: https://forms.gle/eAY1ybf9n3t4uTr49 and program details: https://drive.google.com/drive/folders/1oVTw2UNKpB9sTm7dsih1W05ZHoztDFGI?usp=drive_link . Please visit Department of Mathematics web site: https://www.new.ggu.ac.in/departments-details/20/0/ for other detail of the course.</p>

The Faculty (Foreign Expert)



Vasile BERINDE is Professor of Mathematics at Technical University of Cluj-Napoca, Baia Mare Campus, Romania, where he has been teaching since 1990. He earned B.S. and M.S. degrees in Computer Science and Ph.D. in Mathematics from the "Babes-Bolyai" University of Cluj-Napoca. His main research interest is in Nonlinear Analysis, particularly in Metric Fixed Point Theory. He has published over 200 research papers, several books and a highly cited monograph at Springer (Iterative Approximation of Fixed Points, 2007). He has been included in the 2016 and 2017 Thomson Reuters (Clarivate Analytics) List of Highly Cited Researchers as well as in the Stanford University World's Top 2% Scientists List (2020, 2021, 2022 and 2023). Dr. Berinde received the Distinguished Research Award of Technical University of Cluj-Napoca (2013). He has been elected as Honorary Doctor (Doctor Honoris Causa) of Donetsk National Technical State University (Ukraine, 2000) and of University "Ovidius" Constanța (Romania, 2021). He served as Dean of the Faculty of Sciences, and then as Director of the Doctoral School of Mathematics and has been the Director (Chairman) of the Department of Mathematics and Computer Science (1995-2024). He served as a member (2012-2016) and Chairman (2018-2020) of the Mathematics Committee for Academic Titles Attestation of the Ministry of Education and is currently the coordinator of the Committee of the Ministry of Education for accreditation of Mathematics Higher Education programmes in Romania. Dr. Berinde is a full member of the Academy of Romanian Scientists and served as the vice-president of Romanian Mathematical Society (2012-2021). He is the founding Editor-in-Chief of Carpathian Journal of Mathematics (a Q1 SCI journal) and Editor for some other important journals in Nonlinear Analysis. So far, under his supervision, 21 PhD students defended their PhD theses. He has given many Keynote/Plenary/Invited lectures to international conferences and also numerous seminar lectures to various universities and nonlinear analysis research groups worldwide.

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Indian Experts:



P. Veermani (Retd. Professor, IIT, Madras)

Professor P. Veeramani is a retired faculty member from the Department of Mathematics at IIT Madras. His research interests include Fixed Point Theory and Applications, Game Theory and Best Approximations, and Fuzzy Metric Spaces. Over his career, he has made significant contributions to these fields, with numerous publications and collaborations. He has also been involved in teaching courses such as Functional Analysis and Calculus. His work has garnered significant citations, reflecting his impact in mathematical research.

Weblink: <https://math.iitm.ac.in/people/Retired-Faculty>

Course Coordinator:



P. P. Murthy (Professor and Dean) is presently working as a senior faculty member in the Department of Mathematics at Guru Ghasidas Vishwavidyalaya, Bilaspur, India. His research focuses on ***Fixed Point Theory and its applications, Cryptography and Computational Mathematics (Data Science)***. He has contributed significantly to the field through various publications and has been recognized for his work on compatible mappings of type(A), Gregus type condition and common fixed points. He has visited so many countries with Govt. Fundings (UGC, DST, CCOST, Pondicherry Govt.) like Italy, Thailand, South Korea, Turkey, France, USA, East Africa Prof. Murthy has held several academic and administrative roles, reflecting his extensive experience and dedication to mathematics education and research.

Weblink: <https://www.ggu.ac.in/Department-Staff.aspx>

<https://scholar.google.com/citations?user=2A9EM0gAAAAJ>

Course Co-ordinator

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