BRAIN RHYTHMS: UNDERSTANDING, MEASUREMENT, ANALYSIS AND APPLICATIONS

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Overview

Twenty first century is about brain. After the golden era of physics in the twentieth century, we have realized that we have a far better understanding about the subatomic and intergalactic space than what we know about our brain. Not surprisingly two megaprojects, one in Europe and the other in USA with a total budget over a few billion dollars, have been initiated in order to have a better understanding of the brain network.

Neuronal oscillations, or brain rhythms, are direct markers of neuronal activity that can be easily recorded from the scalp. Brain oscillations are self-organized, ubiquitous in brain, present across spatial and temporal scales, and play a key role in the neuronal information processing. Brain rhythms are the most complex signal produced by humans, and subserve forming a distributed brain network that are associated with every sensory and cognitive functioning. The implications and potential future impact of a thorough understanding of brain rhythms are immense. In addition to basic cognitive neuroscience, the range is as wide as addressing issues related to finding biomarkers in neurological and mental disorders to brain-machine interface, neuromarketing, deception research, neural prosthetics etc.

This course offers a broad guide to the theory and practice of measuring and analysing neuronal oscillations. This course aims to acquaint participants with latest analysis tools and practices in this field. Each lecture will be laden with practical applications in both basic and clinical settings. The attendees will develop an in-depth knowledge of the nature and characteristics of brain oscillations and networks. Further they will develop an understanding of what and how brain oscillations are recorded, how to analyse them, what the methodological issues are, how to interpret the findings and what can we learn from them.

Modules	A: **Understanding and Measurement** **:** **June 13 - June 15, 2016** B: **Analysis and Applications** **:** **June 16 - June 24, 2016** **Number of participants for the course will be limited to fifty.**
You Should Attend If...	▪ you are an electronics/ electrical/ computer science engineer or research scientist, senior UG, PG, PhD student or faculty member interested in having - a clear neurophyisiological understanding of brain oscillations as recorded noninvasively; - a knowledge of recording techniques for monitoring large scale brain responses; - a detailed treatment on a diverse range of data analysis tools (from both univariate and multivariate to network based approaches, and from linear to nonlinear approaches) for the analysis of the complex neural signals; - a practical know-how on brain oscillations.
Fees	The participation fees for taking the course is as follows: **From abroad : US $500** **From Industry/ Non-Govt. Research Organizations, Independent Professionals: Rs. 20000** **From academic faculty / Govt. Research Organizations: Rs. 7500** **Students: Rs. 1000** (refundable on successful course completion, 25 seats reserved) The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. It does not include boarding and lodging cost. The participants will be provided in-campus accommodation on payment basis.

The Faculty

Prof. Joydeep Bhattacharya, the course faculty is a Professor of Psychology, Head of Brain and Cognition Cluster, and the Director of EEG Laboratory at Goldsmiths, University of London. He is a well known expert on the analysis of neural signals. Over the last fifteen years, he has been conducting research in the field of cognitive neuroscience. Prof. Bhattacharya's research group is actively engaged with the understanding of human brain functioning in higher complex cognition. He has coauthored over 90 peer-reviewed articles, over hundred conference presentations, an academic monograph, and several book chapters. He was earlier associated with Max Planck Institute in Germany, California Institute of Technology in USA, and Austrian Academy of Sciences in Austria. His research has regularly been featured in mainstream media e.g., BBC, ABC, The Guardian, The Telegraph, Wall Street Journal, The Economist, Scientific American, New Scientist, The Times, The New Yorker. He is a fellow of the Royal Society of Arts, UK.

Prof. Goutam Saha, the host faculty is a Professor in the Department of Electronics & Electrical Communication Engineering at Indian Institute of Technology Kharagpur. He serves as the Professor-in-Charge of its Audio and Biosignal Processing Laboratory that has strong national and international collaboration. His research interest includes analysis of heart, lung, neuro and speech signals. He has filed several patent, published research work in peer reviewed journals and coauthored two popular engineering textbooks. His works came as winner of DST-Lockheed Martin India Innovation Growth Program, editorial article of peer reviewed research journal and were covered by leading media. He is responsible for coordinating important initiatives related to healthcare technology development at institute and national level.

Course Coordinator

Prof. Goutam Saha
Phone: 03222-283556
E-mail: gsaha@ece.iitkgp.ernet.in

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http://www.gian.iitkgp.ac.in/GREGN