

# Neural Actions of Psychotropic Drugs

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**COURSE CODE:174046G01**

## Overview

The World Health Organization recently estimated that one in four people in the world would be affected by mental or neurological disorders at some point in their lives. Around 450 million people currently suffer from such conditions, placing mental disorders among the leading causes of ill health and disability worldwide. Therefore, we are in an era in which the use and abuse of recreational and prescription drugs is reaching unprecedented levels. Yet, users and clinicians are often unaware of the actions of psychotropic drugs in the central nervous system.

Psychotropic drugs are increasingly used due to their therapeutic actions for a number of psychiatric conditions, however, given their addictive potential, the potential for their abuse is significant, and with extended use, side effects come to outweigh the benefits of these drugs. Moreover, many classes of psychotropic drugs induce neuroadaptations that also constrain the therapeutic actions of drugs. Increasing research is now being conducted to better understand the actions of psychotropic drugs and develop treatment paradigms that optimize their actions.

The course is organized to cover the main neuroreceptor systems targeted by psychotropic drugs. This will include the major excitatory (glutamate) and inhibitory (GABA) systems, classical neurotransmitters (acetyl choline and monoamines), opioid systems and cannabinoid systems. We will discuss the distribution, molecular organization, and function of the main receptor classes, both as they relate to neural transmission as well as synaptic plasticity. We will also present an overview of artificial receptor systems recently developed to manipulate neuronal circuits optogenetically (opsins) or chemogenetically [designer receptors exclusively activated by designer drugs (DREADD)].

Analyses will cover molecular interactions at the level of receptor and post-receptor signaling, as well as effects on specific neuronal populations, neuronal circuits, and global network activity.

At the behavioral level, we will cover behavioral effects of psychotropic drugs in preclinical models of: (a) learning and memory, (b) mood and motivation, (c) fear and anxiety, and (d) reward. Different behavioral paradigms will be introduced at the lectures and discussed in more depth during tutorials.

A GIAN program in “Neural Actions of Psychotropic Drugs” at Dr. Harisingh Gour University, Sagar would be a leading program for sharing of “knowledge and technology” from foreign expert to Indian researchers; especially for researchers in the area of neuroscience, aspiring to lead in diagnostics and therapeutics. The invited foreign faculty (Dr. Jelena Radulovic, M.D., Ph.D., Professor at Northwestern University, Chicago at Feinberg School of Medicine with a dual appointment in the Psychiatry and Behavioral Sciences, and the Pharmacology departments) is well known for her expertise in neuronal networks, signal transduction pathways, and gene responses related to memory and fear. The objectives will be covered by providing exposure to basic research strategies used to assess psychotropic drug actions and their suitability as therapeutics. The course will also offer awareness about the psychotropic drugs and their socio-economic burden in context to the Indian society as well.

Organization of MHRD-GIAN program at remotely located, yet well-equipped, Dr. Harisingh Gour University would be of great importance to the researchers in the area and to draw new lines in neuroscience. The program may also lead to develop new networks and consortium between the

two nations by bridging scientific developments, exchanging academic support, and providing better opportunities in human health.

The program will be organized in two modules: module 'A' tutorials followed by module 'B' demonstration of research work. Course participants will learn theoretical and technical aspects of neuroscience. Participants will also take part with assignments, demonstrations, and skill development sessions for motivation in neuroscience. The program has been approved to be "One Credit Course".

<b>Modules</b>	<b>A: Tutorials : January 13-18, 2020</b> <b>B: Demonstrations : January 13-18, 2020</b>
<b>Who can attend it</b>	<ul style="list-style-type: none"> <li>▪ <b>Participants from Industry, Research Organizations, Faculty and Students from various streams such as Life Sciences, Neuroscience, Forensic Sciences, Pharmaceutical Sciences, Social Sciences and Psychology, and others all over the world interested are welcome to register for the course.</b></li> </ul> <a href="http://www.gian.iitkgp.ac.in/GREGN/index">http://www.gian.iitkgp.ac.in/GREGN/index</a>
<b>Fees</b>	<p><b>The participation fee for taking the course is as follows:</b></p> <p><b>Participants from abroad : US\$ 200</b></p> <p><b>Students (U.G. and P.G.) : INR 800*</b></p> <p><b>Ph.D. and Postdoctoral Fellows : INR 1500*</b></p> <p><b>Faculty from academia : INR 2000</b></p> <p><b>Industry Participants : INR 5000</b></p> <p><b>* Fee for SC/ST Candidates: 50% waived off.</b></p> <p>The above fee includes all instructional materials and working lunch.  The participants may be provided with accommodation on payment basis, if requested.</p>

## The Faculty



**Dr. Jelena Radulovic**, M.D., Ph.D., is a Professor at Northwestern University, Chicago at Feinberg School of Medicine with a dual appointment in the Psychiatry and Behavioral Sciences, and the Pharmacology departments. Dr

Radulovic was also installed as the Dunbar Professor of Bipolar Disorders.

Dr. Radulovic studies the molecular and cellular mechanisms by which memories of stressful events contribute to anxiety- and depression-like behavior. Specifically, her interests lies in neuronal receptors, signal transduction pathways and gene responses.

The current research predominantly focuses on the characterization of the roles of the hippocampal serine/threonine kinases cyclin-dependent kinase 5 (Cdk5) and extracellular signal-regulated kinases (Erk 1/2) in memory formation. They combine behavioral mouse models with molecular, biochemical and immunohistochemical approaches to unravel the roles of these signaling pathways in vivo. Dr. Radulovic's long-term goal is to elucidate the key brain mechanisms linking cognitive and emotional processes and identify novel targets for treatment of anxiety and depression.

Dr Radulovic has contributed a great deal to the scientific community. She has more than 100 publications, which have been featured in prestigious journals like Learning and Memory, Neuron, and Nature Neuroscience. She is currently an editor for the journal Behavioral Neuroscience. She is also fluent in English, German, Serbian, Italian, and French.



**Prof. Janak Ahi** is a faculty of the School of Biological Sciences, Head, Department of Zoology at Dr. Harisingh Gour University (A Central University), Sagar, India. Dr Ahi has about 33 years of teaching experience in Zoology.

Dr Ahi's research interest are insect immunity and tumor biology in insects. She is interested in the protein profiling of the immune challenged insects. She has many national and international papers in journals of repute to her credit. Dr Ahi was awarded German Academic Exchange Service Fellowship (DAAD) and was working in the Department of Neurobiology, Phillips University, Marburg, Germany. Dr Ahi was also working as a PDF in the Max Planck Institute for Experimental Medicine, Department of Molecular Neuroendocrinology, Goettingen, Germany for a period of three years.

Apart from her academic experience she also has administrative experience to her credit.

### Course Co-ordinator

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Information visit:  
[www.dhgsu.ac.in/news.php](http://www.dhgsu.ac.in/news.php)