



INTERNATIONAL WORKSHOP

on

Advances in Functional Genomics and Gene Editing

An event under GLOBAL INITIATIVE FOR ACADEMIC NETWORKS (GIAN)

10-14 March, 2025

Overview

Functional Genomics aims at providing comprehensive approaches to develop and promote high throughput and large-scale approaches to investigate genome functions, their products and the interactions between the two. Non-coding RNAs such as lncRNAs, miRNAs, siRNAs etc are involved in various biological and cellular processes, such as genetic imprinting, chromatin remodelling and gene regulation. Given the abundance of non-coding RNAs, tens of thousands still need to be functionally characterized. Various types of genomic data on lncRNAs are currently available, including sequences, secondary and tertiary structures, transcriptome data, and their interactions with related proteins or genes. The key challenge is to integrate data from myriad sources to determine the functions and the regulatory mechanism of these ubiquitous non-coding RNAs. This workshop will focus on computational methods of utilizing big data for the prediction of non-coding genes and their characterization, followed by functional validation of genes using overexpression and gene editing tools such as CRISPR Cas systems.

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| Course Duration | March 10, 2025 – March 14, 2025 (5 days, 12 hours of lectures and 20 hours of tutorials) |
| Lectures | <ol style="list-style-type: none">1. Introduction to Bioinformatics and Genome Sequencing Technology2. Genome wide survey of gene families and their bioinformatic characterization3. Introduction to gene regulatory molecules- miRNA, its biogenesis and roles in plants4. Interaction of non-coding RNAs for regulation of gene expression5. Long non-coding RNAs and their functional role in plants6. Functional Network of Novel Barley MicroRNAs and Their Targets in Response to Drought |

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| | <ol style="list-style-type: none"> 7. Introduction to the gene editing technology 8. Application of gene editing in trait improvement in plants 9. Multi-target genome targeting in tomato, rice and soybean 10. Genome editing for the improvement of nutritional value and food security 11. Genome editing For Trait Improvement in Potato 12. Role of transcription factors and their interactions with non-coding RNAs for crop improvement: a lesson from Barley |
| Tutorials | <ol style="list-style-type: none"> 1. Basics in bioinformatics and in silico gene expression studies 2. Bioinformatics analysis of gene families and their interaction networks with TFs and non-coding RNAs 3. Tools of miRNA identification and characterization 4. Tools for identification of non-coding RNAs. Study of lncRNAs interaction with other genes and non-coding RNAs 5. miRNA secondary structure analysis, validation of identified miRNAs and miRNA target prediction 6. Introduction to the different tools used for selecting vectors (Cas variants), sgRNA designing to overcome off-target effects 7. Oligo duplex formation and vector construction for gene editing 8. Transformation in <i>Agrobacterium tumefaciens</i> GV3101 and plant transformation 9. Genome editing in model and Lower plants 10. Genome editing in Potato and Brassica |
| Who may attend | <p>All the academicians, students, researchers and technologists from universities/institutes, entrepreneurs, firms, vendors and all others who are interested in understanding the functions of regulatory molecules and the areas of CRISPR/Cas genome editing, functional genomics, computational modelling and biotechnology may join this workshop.</p> |
| Fees | <p>The participation fee will be Rs. 1000/- (includes instructional materials, laboratory equipment usage charges, and an internet facility).</p> |

To register Click here: <https://forms.gle/HnycSpysUa9vxezG9>

Bank Account Details for Fee Payment:

Name - Local Coordinator GIAN (Prof. Gurjaspreet Singh)

SBI Account No: 41435937793

IFSC - SBIN0000742

Branch- Sector-14, Panjab University Chandigarh

Foreign Faculty



Prof. Zofia Szweykowska-Kulińska is an experimental molecular biologist. She finished her undergraduate studies and did her PhD at Adam Mickiewicz University in Poznań. She did her long postdoc as Alexander von Humboldt fellow at Wuerzburg University with Prof. Hans Gross and Prof. Hildgurg Beier in the field of pre-tRNA processing. Then she did her short postdoc as EMBO fellow at CNRS, Gif-sur-Yvette with Prof. Henri Grosjean working on tRNA modifications. She did habilitation and obtained full professor title. Her main focus is microRNA biogenesis and function in plants. She is a member of Academia Europea and EMBO and a corresponding member of the Polish Academy of Sciences. Her selected projects include regulation of plant miRNA biogenesis under various stresses, crosstalk between spliceosome and microprocessor machineries in miRNA biogenesis, role of miRNAs in sex organ development in liverworts and various strategies of potato varieties in response to drought.

Host Faculty



Prof. Kashmir Singh is currently working as a Professor in the Department of Biotechnology at Panjab University, Chandigarh. He also serves as the Coordinator of the DST-Centre for Policy Research at Panjab University. Dr. Singh has multiple international research experiences, including a post-doctoral fellowship at Missouri State University, USA, and a Marie Curie fellowship at Adam Mickiewicz University, Poland. Dr Singh has also been a visiting scientist at McGill University, Canada. His research spans multiple aspects of plant sciences, with a particular focus on genetic and genomic studies for crop improvement. He has been recognized with several honors, including being elected as an INSA Associate Fellow in 2024. Dr. Singh is also leading numerous research projects funded by prestigious organizations like ICAR-NASF, DST, DBT, SERB, and CSR focusing on the genetic and molecular mechanisms of plant development and stress responses, aiming to improve crop traits through genomic selection, genome editing, and the study of transcription factors and non-coding RNAs for enhanced stress tolerance. Through his comprehensive research and leadership, Dr. Kashmir Singh continues to make substantial contributions to plant biotechnology, aiming to address global challenges in agriculture and food security.



Dr. Santosh Kumar Upadhyay is currently working as an Assistant Professor at the Department of Botany, Panjab University, Chandigarh, India. He has been working in the field of Plant Biotechnology especially in the area of functional genomics for more than 16 years. His research group at PU has characterized numerous important defence-related protein families such as receptor-like kinases, anti-oxidant enzymes, calcium transporters, chitinases, lectins, etc. They are also characterizing long non-coding RNAs related to the abiotic and biotic stress response. He has established the CRISPR-Cas mediated genome editing in bread wheat and designed a freeware 'SSFinder' for CRISPR target site prediction. In recognition of his strong credentials and contributions, he has been awarded the NAAS-Young scientist award (2017-18) and NAAS-Associate (2018) from the National Academy of Agricultural Sciences, India, INSA-Medal for Young Scientist (2013) from the Indian National Science Academy, India, NASI-Young Scientist Platinum Jubilee Award (2012) from the National Academy of Sciences, India, Altech Young Scientist Award (2011), and MKU-Genomics Award of the Biotech Research Society of India. He has also been the recipient of the prestigious DST-INSPIRE Faculty Fellowship (2012), and SERB-Early Career Research Award, (2016) from the Ministry of Science and Technology, Government of India.

Co-ordinators

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