A REPORT ON

Summer Internship 2024

"Tools and Techniques of Molecular Biology & Bioinformatics"

(20th May- 12th June, 2024)

Date and Venue:

The Summer Internship 2024 took place on 20th May- 12th June, 2024, at Department of Botany, School of Applied Sciences in association with the Centre for Genetics and Genomics Research center, and Cenomics at Centurion University of Technology and Management on offline mode. A total number of 50 students participated in the hands-on training program from different institutes including CUTM like Kalam Institute of Science and Technology, Brahmapur, Utkal University, Govt. Autonomous College, Rourkela, Gangadhar Meher University, Sambalpur, Biju Pattnaik College of Science and Education, Bhubaneswar and also from IIT Kharagpur.

Inaugural Session:

The 21 days hands-on training started with the inaugural session on 20th of May at hall-6, Aryabhatta building. Dr. Rukmini Mishra, Head of Department of Botany and Coordinator of the program welcomed all the participants and encouraged others to learn new skills. The program started with lightning of lamps by our Vice Chancellor Prof. Supriya Pattnaik Madam, Pro Vice Chancellor Dr. Biswajit Mishra Sir, Dean School of Applied Sciences Dr. Yashaswi Nayak. All the dignitaries addressed the gathering and encourage the participants by saying the importance of the internship "Tools and Techniques of Molecular Biology & Bioinformatics". The program coordinator requested the faculties to enlighten with their words of wisdom. Dr. Sagarika Parida, Dr. Madhusmita Barik, Dr. Jatindra Nath Mohanty, Dr. Kalpita Bhatta, and Dr. Animesh Pattnaik gave a brief explanation about the internship. Finally the program is ended with vote of thanks by Dr. Madhusmita Barik.


WELCOME INTERNS


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विकसित भारत अभियान
WELCOME INTERNS !!!
TO
21 DAYS


WELCOME INTERNS !!!
TO
21 DAYS SUMMER
INTERNSHIP
2024
अभियान

Inauguration time with Vice Chancellor Prof. Supriya Pattnaik Madam, Pro Vice Chancellor Dr. Biswajit Mishra Sir, Dean School of Applied Sciences and all participants' faculties and interns

Objectives:

The internship was conducted to give hands-on experience to students and faculty members on several techniques and tools. Our main objectives are to provide practical experience in the field by bridging the gap between theoretical knowledge and real-world applications in the field of tissue culture, molecular biology & bioinformatics. Additionally, the internship provided opportunities for networking, professional development, and enhancing critical thinking and problem-solving skills to the interns.

No. of Students Participated: 50

Convener Details:

1. **Dr. Rukmini Mishra,** Head of Department of Botany and Coordinator of the Centre for Genetic Engineering and Genomics. School of Applied Sciences, Centurion University of Technology and Management
2. **Dr. Jatindra Nath Mohanty**, Department of Botany and Centre for Genetic Engineering and Genomics. School of Applied Sciences, Centurion University of Technology and Management.
3. **Dr. Madhusmita Barik,** Department of Botany and Centre for Genetic Engineering and Genomics. School of Applied Sciences, Centurion University of Technology and Management.
4. **Dr. Animesh Pattnaik,** Centre for Genetic Engineering and Genomics. School of Applied Sciences, Centurion University of Technology and Management.

5. **Dr. Srimay Pradhan,** Department of Botany and Centre for Genetic Engineering and Genomics. School of Applied Sciences, Centurion University of Technology and Management
6. **Dr. Bhageswari Behera,** Department of Botany and Centre for Genetic Engineering and Genomics. School of Applied Sciences, Centurion University of Technology and Management

1st week details with few snap

On the first day of the internship, Dr.Jatindra Nath Mohanty delivered an expert talk on "Introduction to Molecular Biology". He explained about the basics of molecular biology technique, including history, principles, and applications. After the expert talk, participants were escorted to a campus visit with Dr. Gyanranjan Mahalik to look around and observe other works that are going on in campus. They visited Pollinator paradise and learned about the little biodiversity that is beautifully maintained on the campus. Dr. Mahalik explained about the motive of SoAS to maintain a good environment on campus for sustainable development. Dr. Jatindra Nath Mohanty explained details on reagent preparation (CTAB Buffer), procedure and concept of DNA isolation from plant animal, fungus, bacteria, and plasmid as well on the second day. The interns performed DNA isolation from a plant leaf sample and carried out all the hands-on steps involved in the DNA isolation process in two groups supervised by Dr. Jatindra Nath Mohanty, with the help of Mr Dibyashree S Jena, Mr Subham Jyoti Sahoo, Ms Archita Patra, Ms Ankita sahu. Dr. Jatindra Nath Mohanty delivered a lecture on principles of PCR, its mechanism and its applications in the field of Molecular Biology the 3rd day. . They also got an insight into the types of molecular markers, its uses, and marker-assisted selections in this session. He then guided the participants to set up a reaction mixture for DNA amplification using PCR machine (Thermo Cycler). The principle and use of PCR components were explained to them and they performed PCR. It is followed by hands- on training of pcr master mix preparation and performing PCR in 2 groups with co-operation of Mr Dibyashree S Jena, Mr Subham Jyoti Sahoo, Ms Archita Patra, Ms Ankita sahu. The 4th day they got a demonstration of RNA isolation and handling of RNA with Mr. Subham Jyoti Sahoo Ms Archita Patra, Ms. Sonuriya sahu and Mr Dibyashree S Jena. On 24th May 2024, a talk on the Basics of Bioinformatics and Molecular Biology was conducted by Dr. Animesh Pattnaik. The session was designed to provide foundational knowledge and hands-on experience in bioinformatics tools and techniques, primarily focusing on the use of various databases and software for biological data analysis. The event was highly beneficial for interns and professionals seeking to

enhance their skills in bioinformatics and molecular biology. Dr. Pattnaik began the session with an introduction to bioinformatics and its significance in modern biological research. He emphasized the importance of bioinformatics in analyzing and interpreting biological data, which is crucial for advancements in genomics, proteomics, and molecular biology. During the talk, Basic Bioinformatics for thorough analysis on different database like NCBI, PUBMED, PUBCHEM, PDB were performed and instructed. Dr. Pattnaik provided an in-depth overview of several essential bioinformatics databases: Explained its vast repository of biological data, including nucleotide sequences, protein sequences, and genomic information. Demonstrated how to search for specific sequences and retrieve relevant data for further analysis. Highlighted its role as a comprehensive database of scientific literature in the life sciences. Showed techniques for efficient literature searches, utilizing filters and advanced search options. Discussed its utility in chemical information, including small molecules and their biological activities. Demonstrated how to search for chemical compounds, their structures, and related bioactivity data. Introduced its repository of 3D structural data of proteins and nucleic acids. Explained how to access and interpret protein structures for functional and interaction studies.

In the 2nd half Dr. Pattnaik start the training with the Interns received hands-on training in several key bioinformatics techniques: Utilized tools to align multiple sequences to identify regions of similarity and infer functional or evolutionary relationships. Conducted pairwise alignments to compare two sequences, aiding in identifying mutations or conserved regions. Guided the interns through the process of constructing phylogenetic trees using MEGA 11 software. Explained different methods of tree construction and their applications in evolutionary biology. Introduced various tools to study protein-protein interactions. Demonstrated how to predict and visualize interactions, which are vital for understanding cellular processes and developing therapeutic strategies. The talk by Dr. Animesh Pattnaik was a highly informative and practical session that equipped interns with essential skills in bioinformatics and molecular biology.






2nd week details with few snap

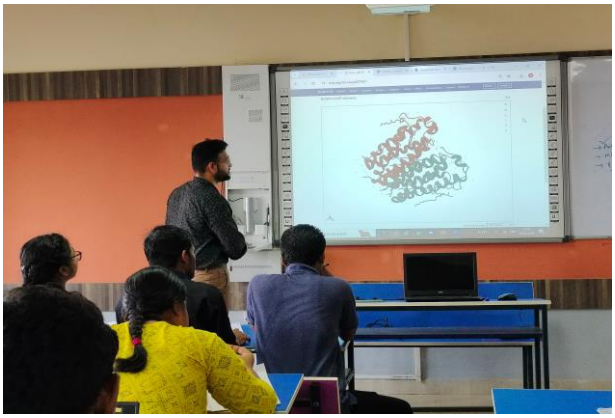
In this week, Isolation and digestion of plasmid DNA were carried out under the supervision of Dr. Jatindra Nath Mohanty & by Ms. Archita Patra, Ms. Sonupriya Sahoo, Mr. Dibyashree s Jena & Ms. Subhasmita Mallik. Students get to know about uses of Plasmid and got hands-on experience in isolation of plasmid. They learned how to prepare competent cells and how to do transformation of plasmid in to competent cells using 2 types of methods, those are heat shock method or by using electroporator. In that week, Dr. Jatindra Nath

Mohanty delivered an expert talk on gene cloning and DNA analysis. During the talk, Dr. Mohanty provided detailed explanations on various types of DNA cloning, the use of restriction enzymes and their types, vectors, cloning methods into vectors, methods of gene transfer, and the blue-white screening procedure. Additionally, he showcased three different case studies based on his own research, highlighting the application of gene cloning and analysis, followed by Cloning and transformation of those plasmids in bacterial cell on the next day by Ms. Archita Patra, Ms. Sonupriya Sahoo, Mr. Dibyashree s Jena & Ms. Subhasmita Mallik. They learned how to prepare competent cells and how to do transformation of plasmid in to competent cells using 2 types of methods, those are heat shock method or by using electroporator. On 29th may 2024, the training start on Molecular Docking was conducted by Dr. Animesh Pattnaik. This session aimed to provide a comprehensive understanding of molecular docking, a key technique in computational biology and drug discovery. Dr. Pattnaik's talk covered both the theoretical aspects and practical applications of molecular docking, offering valuable insights and hands-on training to the participants. He emphasized the role of molecular docking in drug discovery, structure-based drug design, and the study of biomolecular interactions. Dr. Pattnaik explained the principles behind molecular docking, including the concepts of binding affinity, binding site, and conformational flexibility. Discussed the importance of accurate docking simulations in predicting the binding mode and strength of interactions between molecules. Introduced different types of scoring functions used to predict the binding affinity of docked molecules. Explained how scoring functions evaluate the fit between the ligand and the target, taking into account various energetic contributions such as van der Waals forces, electrostatics, and hydrogen bonding.Interns received hands-on training in several key aspects of molecular docking: Demonstrated how to prepare the target protein and ligand molecules for docking. Discussed the importance of cleaning the protein structure, removing water molecules, and adding missing atoms or residues. Dr. Animesh Pattnaik introduced popular molecular docking software such as AutoDock, AutoDock Vina, and Glide. Provided step-by-step guidance on setting up and running docking simulations using these tools. Dr. Pattnaik Demonstrated how to analyze and visualize the docking results. Showed techniques to evaluate the binding interactions, such as hydrogen bonds, hydrophobic contacts, and electrostatic interactions. Discussed the significance of validating docking results using experimental data or additional computational methods.

On the next day students got a session about extraction and analysis of phyto -chemicals from different medicinal plants by Dr, Srimay Pradhan and after the session student got hands on experience of doing extraction using Soxhelet apparatus. Throughout the process they get to

know about the sample preparation, solvent selection for extraction of selective phytochemicals or essential oils and handling and assembling soxhelet apparatus guided by Dr. Srimay Pradhan with Ms. Debasmita Dash & Ms. Subhasmita Mallik. In the 2nd half of the very same day, they did an antimicrobial activity study of extracted oil or crude extracts.. On the very next day they did phytochemical analysis of the crude extracts of plant sample with Ms. Debasmita Dash & Ms. Subhasmita Mallik and in the 2nd half interns have visited our University's renowned botanical collections including the orchid garden, cactus garden and lotus and lily cultivation areas accompanied by our faculty members Dr. Madhusmita Barik and Dr. Bhagyeswari Behera. This visit aimed to enhance botanical knowledge, and promote environmental awareness.

The faculty members provided an insightful introduction to the significance and unique features of each garden. The orientation set the stage for an engaging and educational tour. In orchid garden the students marveled at the diverse species of orchids. They were explained about the specific growing conditions required for orchids, emphasizing the importance of humidity, light, and temperature. The visiting students were particularly interested in our conservation efforts and research on rare and endangered species. The intricate patterns and vibrant colors of the orchids captivated the students, and they learned about the ecological roles of these fascinating plants. The cactus garden, includes a variety of cacti from different arid regions of the world. Our experts discussed the unique adaptations of cacti, such as water storage, spines, and photosynthesis processes. The students were intrigued by the survival strategies of these resilient plants and asked numerous questions, making the session highly interactive. They also learned about the different species of cacti, grafting mechanism and their ecological importance. The lotus and lily cultivation area in the tank provided a perfect setting for learning about aquatic plants. Our teachers explained the cultivation techniques, growth cycles, and ecological significance of lotuses and lilies. The students enjoyed observing the beautiful blooms and understanding the role of these plants in their natural habitats. They also learned about the traditional and cultural importance of lotus and lily plants. On the next day they did microbial culture with a brief by Mrs. Sunanya Das & Ms. Debasmita Das. Throughout the process, students have done media preparation, plating, streaking, and spread plate preparation in 2 groups handled by Mrs. Sunanya Das, Ms. Debasmita Das, Ms. Subhasmita Mallik, and Mr. Abhijit Pattnaik.




LAMINAR AIR FLOW


PLASMID DNA ISOLATION


3rd week details with few snap

The 3rd week started with the microbial DNA isolation from the inoculated sample of previous days. Students have done all the process of DNA isolation with co-operation of Mr. Subham Jyoti sahoo, Ms. Ankita Sahu, Ms. Subhasmita Mallik and Mr. Dibyashree S Jena. They also observed the media plates they have spread and Streaked earlier in previous week and clear the doubts regarding that from Ms. Debasmita Das. On the next day they took a session on Plant tissue culture by Ms. Debasmita Dash, where they learned about different types of tissue culture, tissue culture medias and their composition and practices to do Tissue culture followed by the practicals on media preparation and sample inoculation. On 5th June 2024, a hands-on training session on tissue culture techniques was conducted by Dr. Madhusmita Barik .The session aimed to equip students with practical skills and in-depth knowledge of tissue culture methods, which are essential for modern botanical and agricultural research. The training began with an introduction to tissue culture, where madam explained the significance and applications of this technique in plant propagation, genetic modification, and conservation of rare and endangered species. Students learned about the advantages of tissue culture over traditional propagation methods, such as the production of disease-free plants, rapid multiplication, and the ability to grow plants in controlled environments.

The first practical step involved the preparation of the culture medium. Students were introduced to the components of the culture medium, including nutrients, hormones, and gelling agents. Madam demonstrated the process of mixing and sterilizing the medium using an autoclave. Students learned the importance of maintaining aseptic conditions to prevent contamination and ensure successful tissue culture. Next, students were taught how to select and prepare explants, the plant tissues used for culture. Madam explained the criteria for choosing suitable explants and demonstrated the techniques for surface sterilization using

disinfectants and sterile water. The students practiced cutting and preparing explants under sterile conditions, gaining hands-on experience in handling plant tissues with precision and care. The inoculation process involved transferring the prepared explants onto the culture medium. Students learned how to use sterile tools and techniques to place the explants in culture vessels without introducing contaminants. Madam guided the students through the process, emphasizing the importance of maintaining a sterile environment throughout.

After inoculation, the culture vessels were placed in an incubator with controlled temperature, light, and humidity conditions. Students learned about the different stages of plant development in tissue culture, including callus formation, shoot and root development, and acclimatization. Madam provided insights into monitoring the cultures and identifying signs of successful growth or contamination. Towards the end of the session, Madam discussed the practical applications of tissue culture in various fields, such as agriculture, horticulture, forestry, and pharmaceutical research. The students were encouraged to explore the potential of tissue culture techniques in their future research projects and careers.

On 6th of June 2024, Dr. Madhusmita Barik delivered an insightful lecture on "Abiotic and Biotic Stresses" to the students. This lecture aimed to provide students with a comprehensive understanding of the various stresses affecting plant growth and productivity, as well as the mechanisms plants use to cope with these challenges.

The lecture began with an overview of plant stresses, emphasizing the importance of understanding these factors for improving crop yield and sustainability. Madam explained that plant stresses are broadly categorized into abiotic (non-living) and biotic (living) stresses, each with distinct effects on plant health and development. Abiotic stresses includes drought, temperature extremes, salinity, and nutrient deficiencies and biotic stresses includes pathogen, pest and weed.

The lecture concluded with a discussion on integrative approaches to managing plant stresses. Madam emphasized the importance of breeding and biotechnological strategies for developing stress-tolerant crops. The potential of genetic engineering, marker-assisted selection, and modern breeding techniques in improving plant resilience to both abiotic and biotic stresses was highlighted. The lecture on abiotic and biotic stresses provided students with a thorough understanding of the challenges plants face and the complex mechanisms they employ to survive and thrive. Madam's comprehensive approach, combining physiological, biochemical, and molecular perspectives, offered valuable insights into plant stress biology. The knowledge gained from this lecture will be instrumental for students pursuing research and careers in plant science, agriculture, and related fields,

On 7th june, Dr. Jatindra Nath Mohanty delivered an insightful lecture on “DNA sequencing” to the students, where they learned the sequencing from the basic with it’s history. They learned various types of sequencing to date in society with their principles and merits and demerits.The aim of the lecture is to provide comprehensive knowledge about advanced sequencing technology to the students. Here they understand about the principle and working mechanism of nanopore sequencing with the praticals thereafter where students did the practices with the sequencer under his guidance with Mr. Subham Jyoti Sahoo. They learned about the strategy of nanopore sequencing and thoroughly got an overview on the procedure and practiced sample loading in dummy flow cell.

Valedictory program:

The valedictory program graced by esteemed guests including Dr. Rukmini Mishra, Head, Department of Botany, School of Applied Sciences at Centurion University of Technology and Management, as well as all the staff of the Department of Botany and Zoology. The validation program was conducted to acknowledge the interns' achievements, and prize distribution took place based on their performance. During the program, the interns had the opportunity to share their experiences from the past 21 days. They expressed their happiness and gratitude for the hands-on practical experience they gained in various areas such as plant tissue culture, molecular biology, sequencing, and bioinformatics. The interns found their summer holidays well-utilized and were appreciative of the valuable learning experiences provided to them.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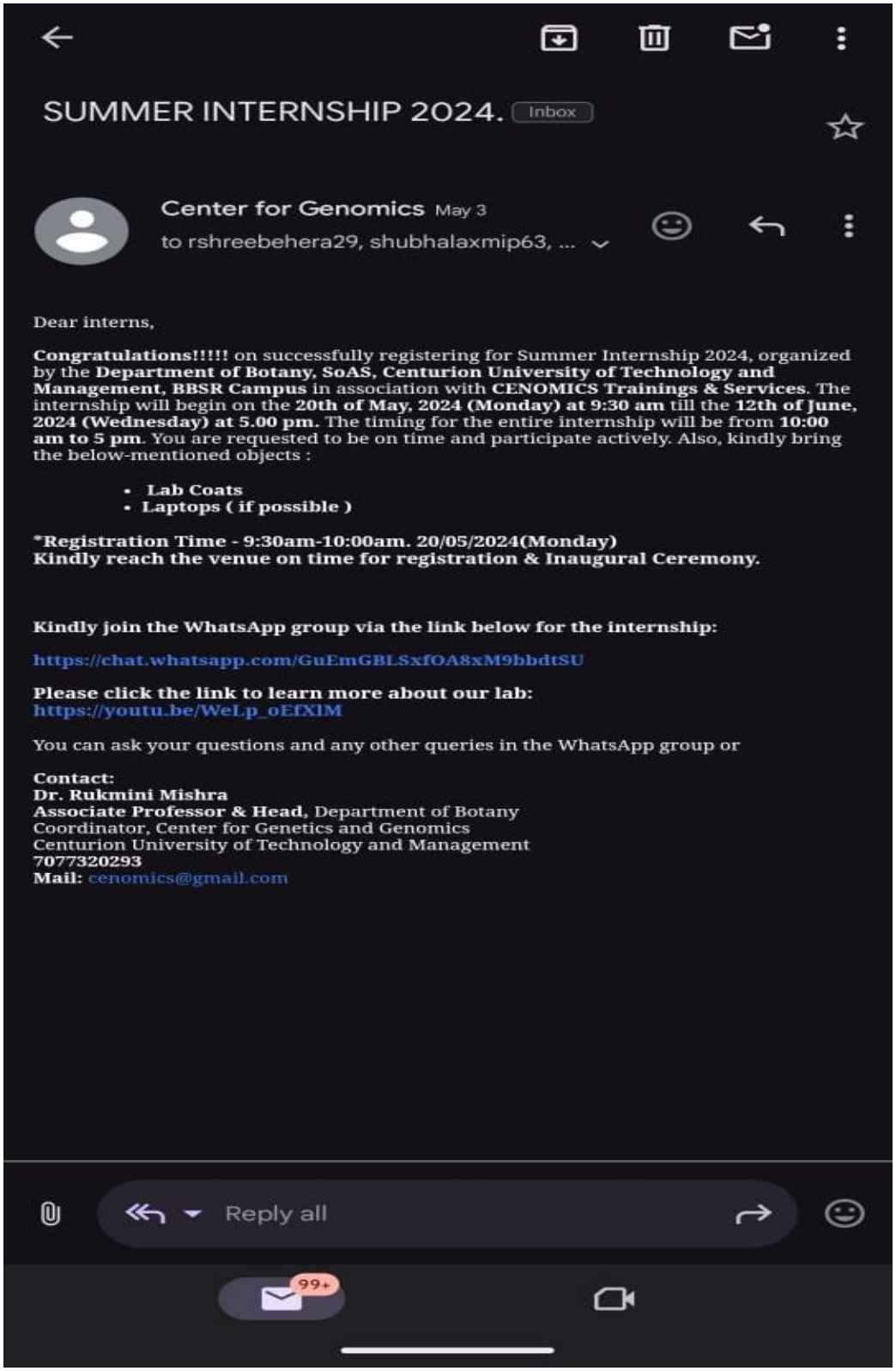

SUMMER INTERNSHIP 2024. Inbox

Center for Genomics May 3
to rshreebehera29, shubhalaxmip63, ...

Dear interns,

Congratulations!!!!! on successfully registering for Summer Internship 2024, organized by the **Department of Botany, SoAS, Centurion University of Technology and Management, BBSR Campus** in association with **CENOMICS Trainings & Services**. The internship will begin on the **20th of May, 2024 (Monday) at 9:30 am** till the **12th of June, 2024 (Wednesday) at 5.00 pm.** The timing for the entire internship will be from **10:00 am to 5 pm.** You are requested to be on time and participate actively. Also, kindly bring the below-mentioned objects :

- **Lab Coats**
- **Laptops (if possible)**

***Registration Time - 9:30am-10:00am. 20/05/2024(Monday)**
Kindly reach the venue on time for registration & Inaugural Ceremony.

Kindly join the WhatsApp group via the link below for the internship:

https://chat.whatsapp.com/GuEmGBLSxfOA8xM9bbdtSU

Please click the link to learn more about our lab:
https://youtu.be/WeLp_oEfXlM

You can ask your questions and any other queries in the WhatsApp group or

Contact:
Dr. Rukmini Mishra
Associate Professor & Head, Department of Botany
Coordinator, Center for Genetics and Genomics
Centurion University of Technology and Management
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Mail: cenomics@gmail.com

Reply all

99+

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SUMMER INTERNSHIP

2024

Hands-on training on tools & techniques of MOLECULAR BIOLOGY, NANOPORE SEQUENCING & BIOINFORMATICS

STARTS From May 20th 2024 , 10.00AM - 05.00 PM

WHAT YOU'LL GET:

- Hands-on training and experience
- Study materials
- Internship certificates

GOT ANY QUERIES???

Contact:
Dr. Rukmini Mishra
Associate Professor & Head, Department of Botany, SoAS, CUTM, BBSR
Coordinator: Centre for Genetics and Genomics
Mob: 7077320293
Mail: rukmini.mishra@cutm.ac.in

REGISTRATION FEE:
RS. 5000/-

(Includes chemical and consumable expenses study materials & Certificate)
Food & Accommodations extra.

FOCOUS AREAS:

- Isolation, Purification & Quantification of genomic DNA/ RNA (Plants, Bacterial & Fungal)
- PCR & types of Markers.
- Gene cloning & Transformation
- Restriction digestion, Ligation, Colony PCR
- Plant Tissue culture
- Bioinformatics analysis (transcriptomics, whole genome sequencing & variant calling)
- Molecular docking & simulations.
- Plant propagation and culture. (Orchids, Lotus, Waterlilies, Cacti & Succulents)

REGISTRATION:

https://forms.gle/fH3mXFDRvH75nYLy7

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Venue:
CENTURION UNIVERSITY OF TECHNOLOGY & MANAGEMENT, BHUBANESWAR CAMPUS

Dr. Rukmini Mishra
(Program Co-Ordinator)

Dr. Yashaswi Nayak
(Dean, SoAS)