

A Report
on
HAND'S ON SKILL DEVELOPMENT WORKSHOP (Add on Course)
(ONE WEEK CERTIFICATE COURSE)
ON
“BASIC TOOLS IN BIOTECHNOLOGY”

Date: From 25th April to 08th May 2023, Time- 9.30 am to 5:00 pm

Venue: E-YUVA Centre, Adamas University (Supported by BIRAC)

Organizing Committee

Patrons



Prof. (Dr.) Samit Ray
Hon'ble Chancellor, Adamas University



Prof. Papia Chakraborti
Principal, Brahmananda Keshab Chandra College

Conveners



Dr. Saptarshi Chatterjee
Chief Coordinator, E-YUVA Centre, (Supported by BIRAC)
Associate Director, Center for Incubation
Associate Professor, Microbiology
Adamas University



Dr. Sourav Sikdar
Assistant Professor, Dept. of Zoology
Brahmananda Keshab Chandra College

Organizing Secretary



Dr. Mousumi Saha
Project Coordinator, E-YUVA Centre
Adamas University (Supported by BIRAC)



Dr. Neelakshi Sarkar
Assistant Professor, Dept. of Zoology
Brahmananda Keshab Chandra College

Resource Persons



Dr. Saptarshi Chatterjee

Chief Coordinator, E-YUVA Centre,
(Supported by BIRAC)

Associate Professor, Microbiology
Adamas University



Dr. Sourav Sikdar

Assistant Professor, Dept. of Zoology,
Brahmananda Keshab Chandra
College



Dr. Neelakshi Sarkar

Assistant Professor, Dept. of Zoology,
Brahmananda Keshab Chandra College



Dr. Soumalya Mukherjee

Head and Assistant Professor, Dept. of Zoology,
Brahmananda Keshab Chandra College



Dr. Arijit Bhattacharya

Associate Professor & HOD, Dept. of
Biological Science, Adamas University



Dr. Mousumi Saha

Project Coordinator, E-YUVA Centre,
Adamas University

(Supported by BIRAC)



Dr. Samrat Paul

Innovation Fellow (PDF), E-YUVA Centre,
Adamas University

(Supported by BIRAC)



Dr. Goutam Mukherjee

Innovation Fellow (PDF), E-YUVA Centre,
Adamas University

(Supported by BIRAC)

Industrial Partners



SynBiogenesis is a multidimensional Biotech Skill Development and R&D hub, approved by Ministry of Corporate affairs, Government of India. They are equipped with standards lab facilities with modern instrumentation facility for conducting skill development program and workshop on various aspects of biotechnology.



ProteiNext India is an innovative company that utilizes a multi-faceted approach to address the critical issue of sustainability of feed through insect farming. Our company owns an official approval by the Ministry of Corporate Affairs. At ProteiNext India, we take pride in our ability to transform insect products and by-products into something new and valuable.

Course Highlight:

- Introduction to molecular biology laboratory and basic lab equipment
- Isolation of bacterial genomic/plasmid DNA
- Isolation of DNA from human blood sample
- Quantification and Purity Assessment of DNA
- Agarose Gel Electrophoresis with Gel Documentation
- Basic on Primer Designing
- Demonstration of Polymerase Chain Reaction (PCR)
- Basic Bioinformatics tools
- Research talk on genomics
- Industrial Session



Time Schedule for the Workshop

Day	9.30 am – 10.00 am	10.00 am – 11.00 am	11.00 am – 12.00 noon	12.00 noon – 1.00 pm	2.00 pm – 5.00 pm
25 th April, 2023 (Tuesday)	Inauguration and Registration	Webinar by Entrepreneur Mr. Rupankar Bhattachayee, Kumbhi Kagaz Pvt Ltd on Innovation in Waste Management	Research Talk on Genomics by Dr. Arijit Bhattacharya	Industrial Session by ProteiNext India Pvt. Ltd.	Industrial Session by SynBiogenesis (2.30 pm – 3.30 pm)
26 th April, 2023 (Wednesday)	Training, Seminar and Poster Competition on IPR				
27 th April, 2023 (Thursday)	Workshop on IPR with DSTBT, Govt of West Bengal along with exhibition. (Interested registered Students can participate in the program)				
28 th April, 2023 (Friday)	Theory Class on DNA (Dr. Saptarshi Chatterjee)	Introducing Lab and Instruments (Dr. Saptarshi Chatterjee)	Preparation of Reagents and Buffer (Dr. Samrat Paul)	Bacterial Pure Culture Technique (Dr. Mousumi Saha)	
02 nd May, 2023 (Tuesday)	Theory on DNA Isolation Technique (Dr. Neelakshi Sarkar/Dr. Goutam Mukherjee)	Isolation of bacterial genomic/plasmid DNA/Blood (Dr. Goutam Mukherjee/ Dr. Neelakshi Sarkar/ Dr. Samrat Paul)			
03 rd May, 2023 (Wednesday)	Theory on Agarose Gel Electrophoresis (Dr. Sourav Sikdar/ Dr. Goutam Mukherjee)	Checking the purity of isolated DNA spectrophotometrically (Dr. Samrat Paul/ Dr. Sourav Sikdar)	Agarose gel electrophoresis and Visualizing DNA by UV Transluminator (Dr. Goutam Mukherjee/ Dr. Sourav Sikdar)		
04 th May, 2023 (Thursday)	Theory on PCR and Primer Design (Dr. Soumalya Mukherjee/ Dr. Goutam Mukherjee)	PCR (Amplification of DNA) with Visualization - (Dr. Goutam Mukherjee)			
08 th May, 2023, Monday	DNA Sequencing (Dr. Neelakshi Sarkar)	Theory and Practical on Basic Bioinformatics (Dr. Mousumi Saha)	Assessment of the Students; Valedictory and Prize Distribution (All Resource Persons)		

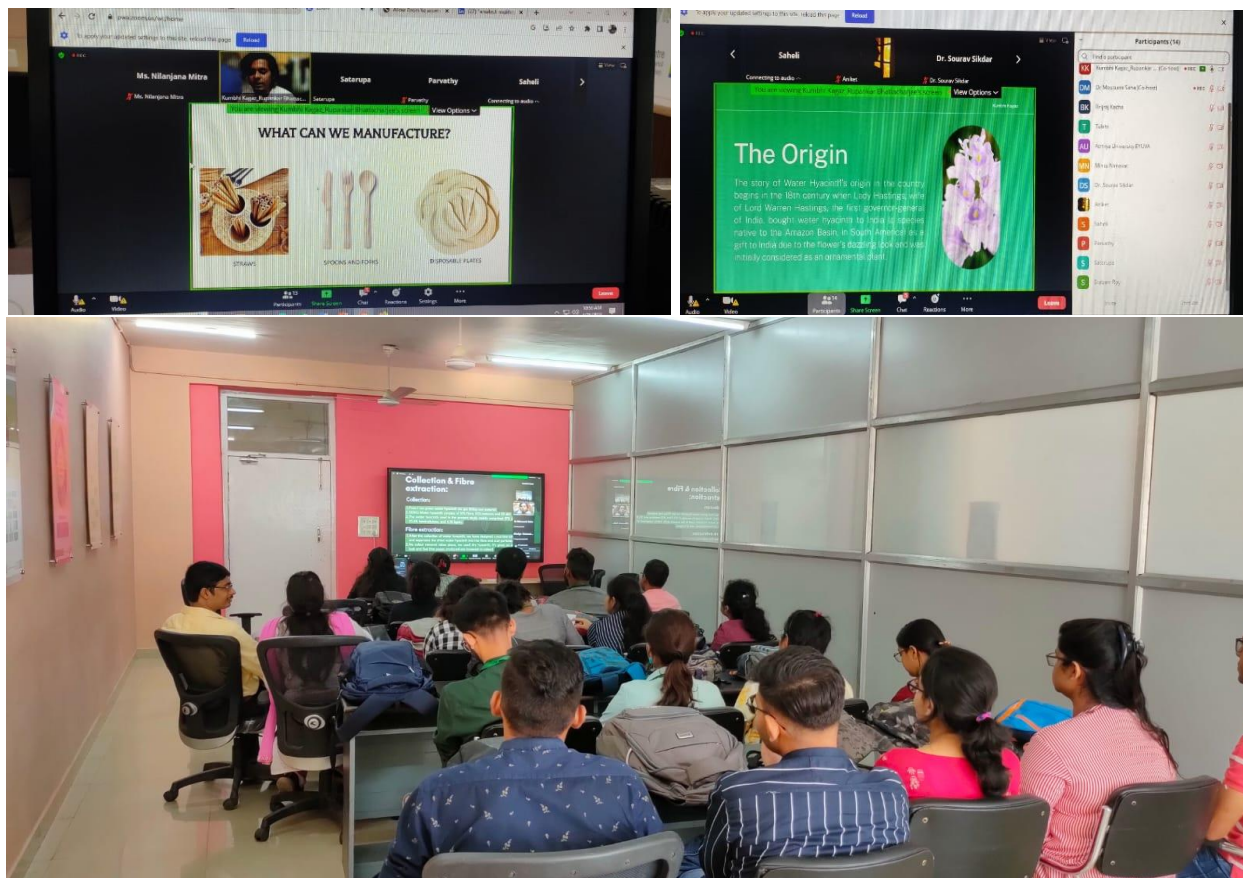
Day 1, 25th April, 2023

Inauguration and Registration- The workshop was inaugurated by the inaugural speech of Prof Dipankar Bhattacharya, PRO VC, Research and Innovation, Adamas University. Then we heard some valuable speech from Dr. Rudra Prasad Saha, Dean, Life Science, Adamas University, Dr. Saptarshi Chatterjee, Chief-coordinator, E-Yuva Centre, Adamas University and Dr. Sourav Sikdar, Assistant Professor, Department of Zoology, Brahmananda Keshab Chandra College.



Inaugural Session on 25th April, 2023

Webinar by Entrepreneur Mr. Rupankar Bhattachayee, Kumbhi Kagaz Pvt Ltd. on “Innovation in Waste Management”. The webinar was very informative and innovative for the students which motivated them a lot for making independent start up on some innovative thinking.



Webinar by Entrepreneur Mr. Rupankar Bhattarchayee, Kumbhi Kagaz Pvt Ltd

Research Talk on Genomics by Dr. Arijit Bhattacharya

That was very in-depth lecture on modern Genomics and related information which influence a lot to all the students.



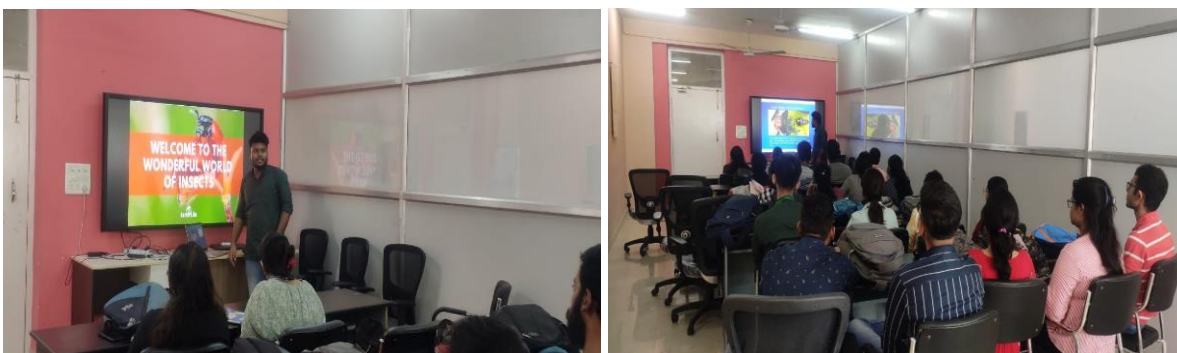
Research Talk on Genomics by Dr. Arijit Bhattacharya

Industrial Session by SynBiogenesis - Mr. Debabrata Mondal and his colleague from SynBiogenesis shared their personal experiences to develop start up of their company and also discussed about how their company works. The lecture was really motivating.



Industrial Session by SynBiogenesis

Industrial Session by ProteiNext India Pvt. Ltd.- last session of the first day was given by Mr. Debjit Safui from ProteiNext India Pvt. Ltd. on his developed food for fish. He is the innovation fellow of E-Yuva Centre, Adamas University. He shared his work experiences and innovation regarding his fish feed development and how it works to in differential age phases of fish. It was also very informative.



Industrial Session by ProteiNext India Pvt. Ltd.

Day 2, 26th April, 2023

Training, Seminar and Poster Competition on IPR

26th April was celebrated as World IPR Day at the main auditorium of Adamas University, inaugurated by Prof. Naveen Das, V.C., Adamas University and other respected dignitaries of different institutions. Then there were three lecture sessions on Innovation and Intellectual Property Rights.





Lecture sessions by respected dignitaries on IPR and its importance

A poster presentation session was held at Swami Vivekananda Seminar Hall on IPR where all of our students had participated and presented four posters on different aspects on IPR. It was a new topic for them and they gathered vast knowledge from the lecture sessions and poster presentations.



Students were presented their posters in front of judges



Faculties with students from both UG Zoology and PG Botany of BKC College during poster presentation session



Group photo on the IPR Day

Day 3- 27th April, 2023

Workshop on IPR with DSTBT, Govt of West Bengal along with exhibition and Prize distribution ceremony

All the students attend this programme, got different informations on IPR, visited exhibition on innovations created by students of Adamas University. At last the names of winners of poster presentation were announced and one group of our students named Samriddha Mukherjee, Parna Das, Saimantik Das and Sandip Kumar Mondal **won the first prize**. It was really a proud moment for us. The title of the prize-winning poster was- '**Patent- A Double Edged Knife**'. They also got Rs. 1500/- in cash as prize money. But all the students gave equal efforts on this poster preparation and presentation as well on this completely new topic for them.



Felicitation to the Guest of Honour



Our students received 1st prize in Poster presentation session

Day 4- 28th April, 2023

Theory Class on DNA

The lecture on 'DNA' by Dr. Saptarshi Chatterjee was very interesting and informative. All the students enriched a lot.

Introducing Laboratories and Instruments

After the lecture session, our students visited the two well equipped laboratories and introduced with different instruments, assisted by Dr. Samrat Paul and Dr. Goutam Mukherjee. Then they learned the use of micropipette hand's on.



Learning the general instructions to use laboratory instruments and use of micropipette

Preparation of Reagents and Buffer

After introducing with all the instruments, they had learned the process of weighing and making of buffers and reagents required for DNA isolation, assisted by Dr. Samrat Paul.



Weighing of chemicals

Bacterial Pure Culture Technique

At the last session of Day 4, students were introduced with bacterial cell culture techniques guided by Dr. Mousumi Saha. They have learned how bacteria culture is spreaded over the surface of an agar plate, resulting in the formation of discrete colonies distributed evenly across the agar surface when the appropriate concentration of cells is plated. They all did individually on separate petri dishes.



Bacterial Cell plate preparation and colony formation

Day 5- 02nd May, 2023

Theory on DNA Isolation Technique

The lecture session on DNA Isolation Technique was taken by Dr. Neelakshi Sarkar. She gave the detailed lecture on the process of DNA isolation from bacteria as prokaryotic origin and from human blood as eukaryotic origin. All the students got enough theoretical knowledge on DNA isolation.



Interactive session by Dr. Sarkar

Isolation of bacterial genomic and human blood

After the lecture session the students were separated into 2 batches and learned the practical demonstration on DNA isolation from both bacteria and human blood. They were guided by Dr. Neelakshi Sarkar, Dr. Samrat Paul and Dr. Goutam Mukherjee. They follow all the steps and did hand's on practical to isolate DNA from both the sources.

Protocols:

ISOLATION OF GENOMIC DNA

Principle: Genomic DNA isolation is a process of purification of genomic DNA from sample using a combination of different physical and chemical method. Total cell DNA is often required as a source of material from which genes are obtained to be cloned. Currently it is a routine process of molecular biology and forensic. There are a number of different procedures for the preparation of genomic DNA; involving three basic steps- cell lysis, deproteination and recovery of DNA. Cell lysis allows the destruction of the cell structures and the release of nucleic acids from the nucleus. DNA extraction is carried out in DNA extraction buffer containing important ingredients such as: Tris buffer to maintain a stable pH; EDTA which sequesters the divalent metal ions that is required for nuclease activity and thereby inhibiting its action; sodium dodecyl sulphate (SDS) is used to aid the process of lysis by removing lipid molecules and thereby causing disruption of cell membranes. Proteinase K(a serine protease) is used, which is a common enzyme used in DNA extraction that degrades the proteins in the cells like nucleases and cuts apart the histones to free the DNA and finally results in the breakdown of cells. . The final step in DNA deproteination is removal of cell debris that can be done by centrifugation. The partially digested cell wall fractions can be pelleted down, leaving the cell extract reasonably clear with the presence of genomic DNA, RNA and some residual protein in the supernatant. Aim: To isolate genomic DNA from *E. coli* cells and amplify 16S r DNA.

- RNase is added to degrade the cellular RNA and the genomic DNA is then purified from the protein- nucleic acid complex by phase extraction with a mixture of organic solvents namely phenol, chloroform and isoamyl alcohol in the ratio of 25:24:1. Phenol dissociates protein from DNA, chloroform denatures those residual proteins and helps to maintain the separation of the organic and aqueous phase and it also makes the DNA less soluble in the phenol thus reducing losses to the organic phase whereas isoamyl alcohol is added to prevent foaming. The result is that if the cell extract is mixed gently with the solvent and the layers then separated by centrifugation,

precipitated protein molecules are left as a white coagulated mass at the interface between the aqueous and organic layers. The aqueous solution of genomic DNA can then be pipetted out. The DNA is then precipitated with 70% ethanol as DNA is insoluble in alcohol and alcohol serves as a wash to remove the residual salts.

Materials required:

1.5M Tris-Cl (pH-8)
0.5M EDTA
10% SDS
1mg/ml Proteinase
10mg/ml RNase
TE buffer (10mM Tris + 1mM EDTA)
50X TAE buffer (Tris base 242g + 0.5M EDTA + 57.1ml glacial acetic acid, distilled water upto 1L)
6X gel loading dye (10mM Tris-Cl of pH- 7.8 , 30% glycerol, 025% bromophenol blue)
Autoclaved water
Tips, microcentrifuge tube, centrifuge tube, glass pipette

Procedure:

- 2ml of *E.coli* culture was centrifuged at 8000 rpm for 5 minutes and 400µl of TE was added to the pellet.
- Next 50µl of 1mg/ml proteinase was added and incubated for 10 minutes followed by the addition of 10% SDS. The mixture was incubated at 37° C in water bath for 40 minutes.
- 250µl of saturated phenol was added to it and the mixture was incubated at 65°C for 30 minutes after invert mixing.
- Next, 250µl of chloroform was added and inverted to mix.
- The mixture was centrifuged at 10,000 rpm for 5 minutes at room temperature.
- Aqueous phase was collected and 10µl of RNase was added to it.
- Incubated for 10-15 minutes in water bath at 37°C.
- Equal volume of phenol, chloroform and isoamyl alcohol (25:24:1) was then added and centrifuged at 12,000 rpm for 10 minute.
- Aqueous phase was collected to which 0.6 volume of Isopropanol was added and incubated at room temperature for 30 minutes.
- The mixture was centrifuged at 14,000 rpm at room temperature for 10 minutes.
- Supernatant was discarded and 700µl of 70% ethanol was added to the separated aqueous phase and centrifuged at 14,000 rpm for 10 minutes at room temperature.
- Supernatant was discarded and the pellet was subjected to air drying.
- 30-40µl of nuclease free water was added with the gel loading dye and gel electrophoresis was performed.



Practical session was going on for DNA isolation from bacteria and human blood



Isolation of DNA by Phenol-chloroform method and separation of DNA from the 3 layers



→ **Isolated DNA after centrifugation**

Day 6- 3rd May, 2023

Theory on Agarose Gel Electrophoresis and checking the purity of isolated DNA spectrophotometrically

Lecture on agarose gel electrophoresis and estimation of purity of isolated DNA by spectrophotometer was given by Dr. Sourav Sikdar. The detailed discussion clears their basic concepts. After the lecture we went for practical demonstration.

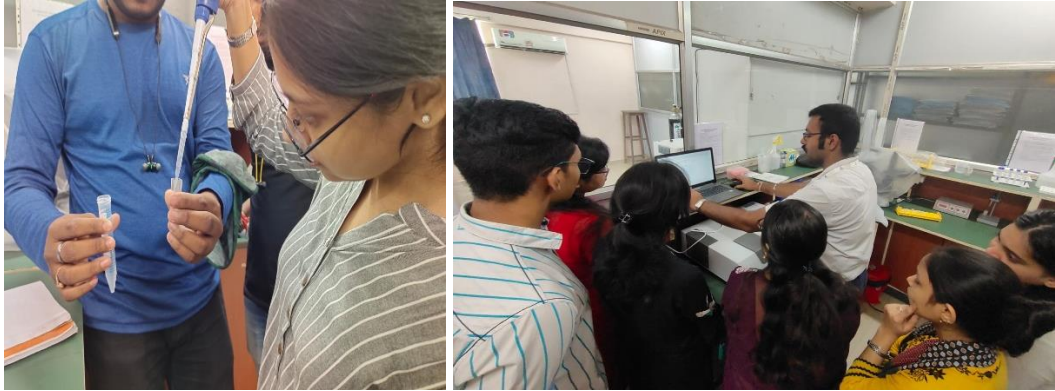


Lecture was presented by Dr. Sikdar

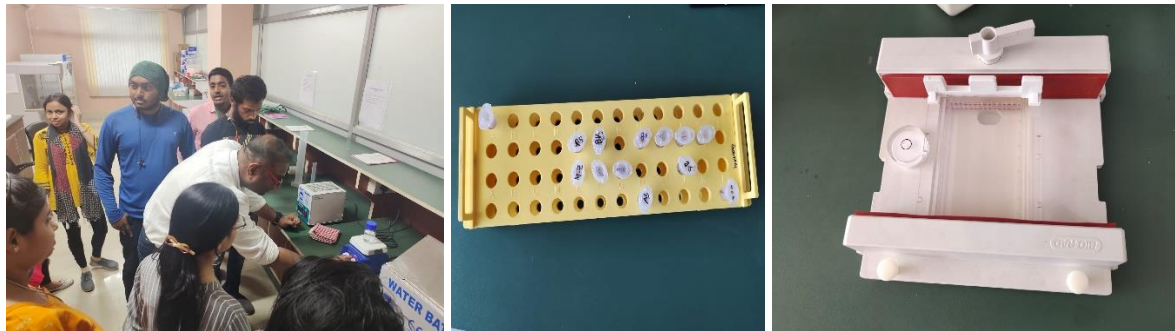
Practical demonstration on Agarose gel electrophoresis and spectrophotometry to check the O.D. of isolated DNA were assisted by Dr. Goutam Mukherjee and Dr. Samrat Paul. All the steps were demonstrated practically and the students did hand's on following the proper instructions.



Interactive session on spectroscopy and agarose gel preparation



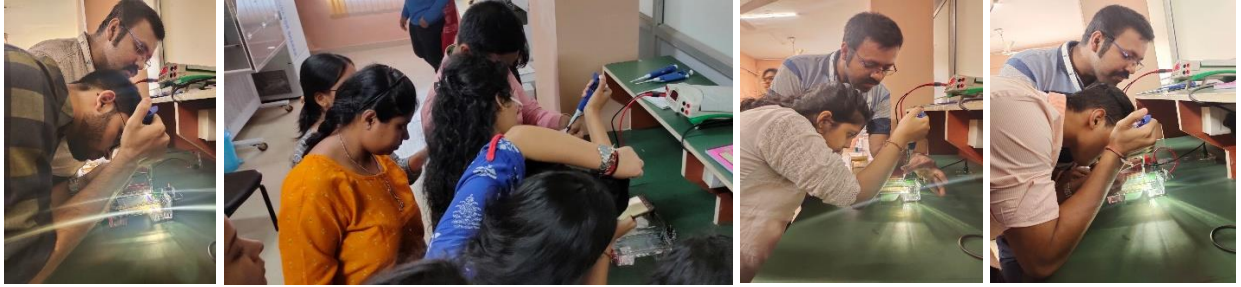
Spectrophotometric analysis of isolated DNA



Preparation of agarose gel and isolated DNA samples to load for gel electrophoresis

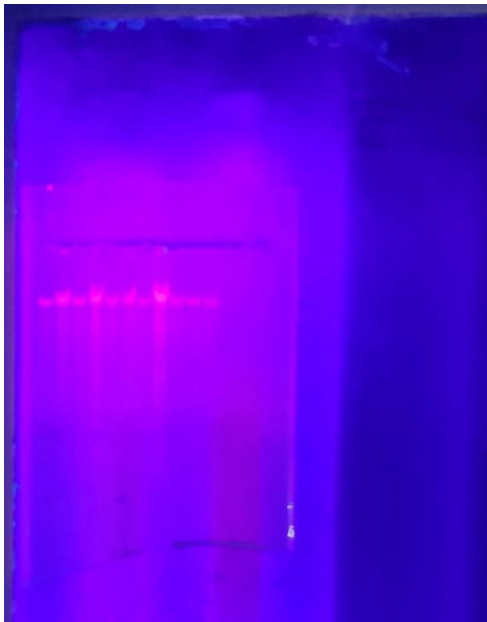


Agarose Gel electrophoresis chamber, prepared agarose gel dissolved in TAE buffer and DNA loading at Agarose gel for electrophoresis

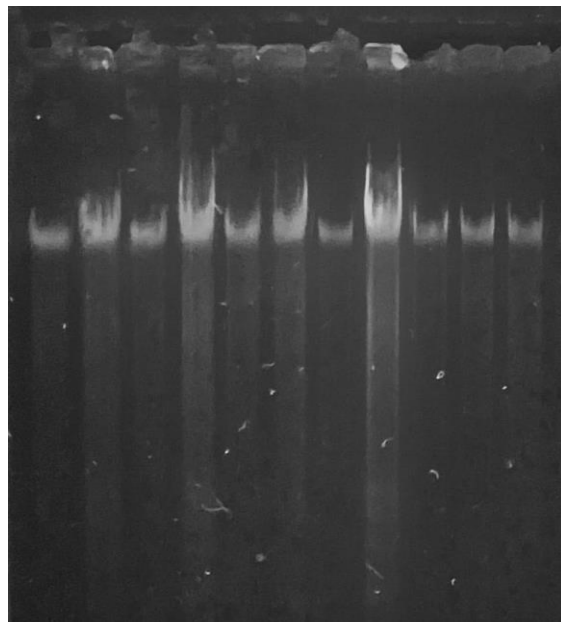


Students were engaged in DNA loading individually for agarose gel electrophoresis

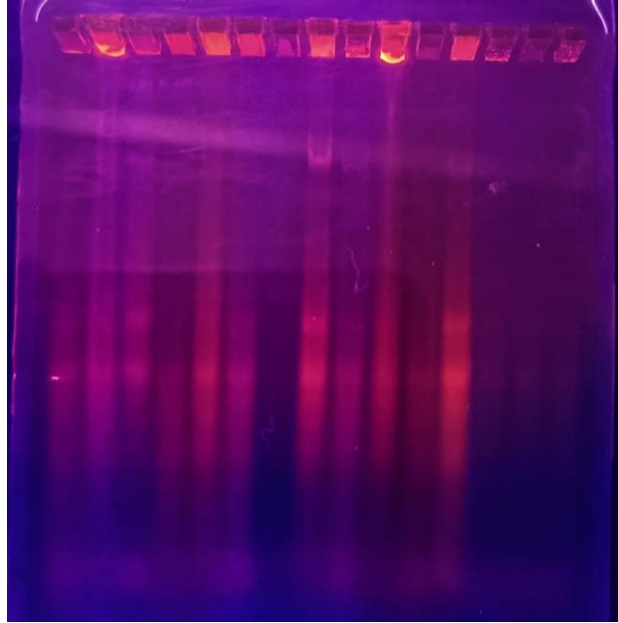
Then the agarose gels were observed under UV Transilluminator and photographs were taken to check the presence of DNA.



A1



A2



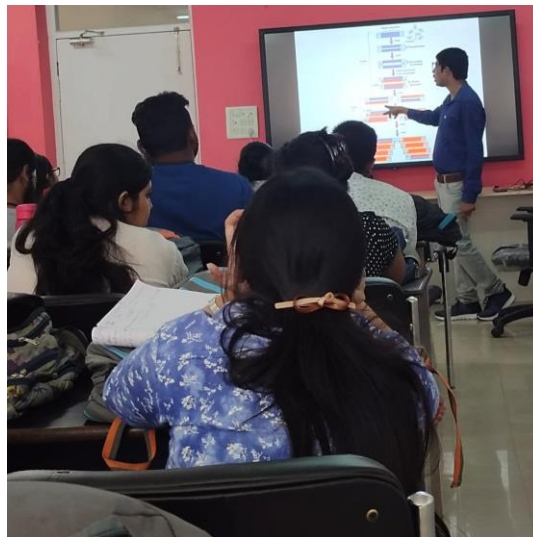
B

Genomic DNA bands were clearly observed under UV transilluminator (A1 and A2 - Human blood & B- Bacteria)

Day 7- 4th May, 2023

Theory on PCR and Hand's on Practical Session

Lecture on PCR was delivered by Dr. Soumalya Mukherjee. All the students got enough knowledge on mechanism of PCR. After this session all the students were practically introduced with PCR machine and sample preparation was guided by Dr. Goutam Mukherjee.



Lecture on PCR was given by Dr. S. Mukherjee



Preparation of PCR mixtures using house keeping genes and their primers



Live demonstration on the use of PCR-Thermocycler



Set up screen at thermocycler after starting the reaction

Day 8- 8th May, 2023

DNA Sequencing

On the 1st half of the last day, a lecture session on DNA sequencing was taken by Dr. Neelakshi Sarkar which gave them very depth information on this topic.

Theory and Practical on Basic Bioinformatics:

The second session was taken by Dr. Mousumi Saha on basic bioinformatics including primer designing and use of different online software. This session was also very interesting for every student.

Then another lecture session was taken by Dr. Arijit Bhattacharya on basic tools in Bioinformatics.

Assessment of the Students

All the participating students were faced general assessment via filling up the google form with 30 MCQ questions on basic biotechnology.

Valedictory Session and Prize Distribution

At the end of this assessment process we were at the ending ceremony of this workshop where we got our respected principal madam Prof. Papia Chakraborti, as chief patron of this hand's on workshop on Basic tools in Biotechnology. All the mentors, supporting staffs and students were gathered at seminar hall of E-Yuva Centre, Adamas University. Our respected principal madam was felicitated by Dr. S. Chatterjee and then we heard some valuable comments from madam. Then Dr. Chatterjee and Dr. Sikdar delivered their very brief comments on this workshop. Two of our students from both UG and PG departments of Zoology and Botany, respectively have shared their workshop experiences. Then all the participating students got certificates. The programme was ended with the Vote of Thanks given by Dr. Neelakshi Sarkar, Secretary of this Workshop. The overall experience was very good and we got positive feed backs from our students.



Falicitation to our respected Principal Madam and we heard valuable speech from madam



Valuable comments on 8 days long workshop by both convenors



Course participation Certificate was given by our respected Principal Madam to the participating students



Course participation certificates were given by course convenors and resource person



Course participation Certificate were given by Course Sectararies



Publishing Booklets on 8 days long Course on Basic Tools in Biotechnology



Participating students from both UG and PG were sharing their course experiences



Vote of Thanks by Dr. N. Sarkar, Secretary of this Workshop



Group Photo at the last day of this workshop

**Registered Candidates' List for One Week Hand On Certificate Course on Basic Tools On
Biotechnology, Jointly Organized by Brahmananda Keshab Chandra College & E-Yuva Centre,
Adamas University**

Serial Number	Name	College	Department	UG/PG	Semester	Contact
1	Saheli Sarkar	Brahmananda Keshab Chandra College	Zoology	UG	6th	9051056876
2	Saimontik Das	Brahmananda Keshab Chandra College	Zoology	UG	6th	9007055837
3	Sandip Kumar Mondal	Brahmananda Keshab Chandra College	Zoology	UG	6th	8777832862
4	Rahit Saha	Brahmananda Keshab Chandra College	Zoology	UG	6th	8481023798
5	Akash Chandra Patra	Brahmananda Keshab Chandra college	Zoology	UG	6th	8910415142
6	Samriddha Mukherjee	Brahmananda Keshab Chandra college	Zoology	UG	6th	9433178945
7	Satarupa Pramanik	Brahmananda Keshab Chandra college	Zoology	UG	6th	8336051848
8	Jeon Saha	Brahmananda Keshab Chandra college	Zoology	UG	6th	7003359038

9	Ranjita Maity	Brahmananda Keshab Chandra college	Zoology	UG	6th	7439137227
10	Ankita Datta	Brahmananda Keshab Chandra college	Zoology	UG	6th	7003811669
11	Shalini Das	Brahmananda Keshab Chandra college	Zoology	UG	6th	8910016952
12	Eshani Dey	Brahmananda Keshab Chandra college	Zoology	UG	6th	9874825091
13	Parna Debnath	Brahmananda Keshab Chandra college	Zoology	UG	6th	7439489423
14	Parna Das	Brahmananda Keshab Chandra college	Zoology	UG	6th	6290303080
15	Debadrita Chatterjee	Brahmananda Keshab Chandra college	Zoology	UG	6th	8420386657
16	Munazzalah Zarrin	Brahmananda Keshab Chandra college	Botany	PG	4th	9163906231
17	Baishali Kundu	Brahmananda Keshab Chandra college	Botany	PG	4th	7003612275

18	Debanjali Das	Brahmananda Keshab Chandra college	Botany	PG	4th	6292130239
19	Rishin Bhattacharyya	Brahmananda Keshab Chandra college	Botany	PG	4th	7980813801
20	Srabani roy	Brahmananda Keshab Chandra College	Botany	PG	4th	7004584461
21	Arpita Sarkar	Brahmananda Keshab Chandra College	Botany	PG	4th	8697821611
22	Aheli Bera	Mrinalini Datta Mahavidyapith	Zoology	UG	6th	9123800649
23	Spandita Ghosh	Panihati Mahavidyalaya	Zoology	UG	1st	6291552768
24	Sambit Naskar	Surendranath college Calcutta University	Physiology	UG	4th	6295432520

Participant List Present on 25th April, 2023

Sl No.	Name of Participant's	Department	E-mail Id	Signature
1.	MUNAZZALAH ZARRIN	BOTANY	2058zarrin@gmail.com	M. Zarrin
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20.	DR. SOURAV SIKDAR	Zoology	mailsouravin@gmail.com	Sourav Sikdar 25/04/23
21.	Dr. Soumya Mukherjee	Zoology	mukherjee.soumya259@gmail.com	Soumya Mukherjee 25/04/23
22.	Dr. Neelakshi Sarkar	zoology	neelakshisarkar2000@gmail.com	Neelakshi Sarkar 25/04/23
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