

# TECHNOLOGY INFORMATION SYSTEM

# BIOCON

**Industry Visit to Biocon Sdn Bhd (Iskandar Puteri, Johor Malaysia): Integrating Biotechnology and Computing Systems**

December 23/2025

## PURPOSE

The purpose of this visit is to enhance students' understanding on how biotechnology company operate and produce biopharmaceutical product such as insulin. The participants of this visit includes students from Bachelor of Computer Network and Security and Bachelor of Bioinformatics. It helps student to relate the theoretical knowledge learned in class to actual industrial practices.

### REPORTED BY :

TAN JUN CHEN (A25CS0141)  
UMAIRAH NASUHA BT KAMARUDIN (A25CS0371)  
FADHIL ATHA RAMADHAN (A24CS4093)  
ZAKY ZULHADI (A24CS4097)

## WHAT IS BIOCON

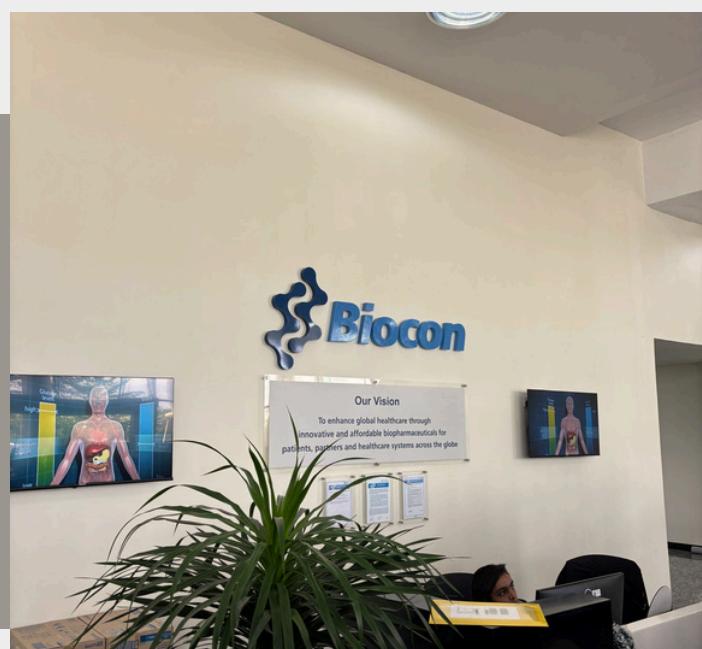
Biocon Sdn Bhd is a well-established company specializing in manufacturing biopharmaceutical product especially insulin and insulin analogues. They focus on producing high-quality and affordable medicines to improve healthcare worldwide.

The nature of Biocon lies in biotechnology and pharmaceutical manufacturing. They operate in advanced biological processes which combine with modern engineering and computing technologies.

Biocon plays an important role in global pharmaceutical and biotechnology industry particularly in the treatment of diabetes. Regionally and globally, Biocon support public health system through innovation and large scale production of medicine.

## OBJECTIVE OF INDUSTRY VISIT

1. To provide closed-up exposure to biotechnology operation in real industry environment
2. To help student understanding computer assisted manufacturing in production process
3. To observe how products move from laboratory research to commercial production (lab-to-market process)
4. To expose student to the integration of computing, networking system and biological process in modern industry.



During the visit, students observed insulin manufacturing processes involving both upstream and downstream biotechnology operations, which begins with fermentation, where microorganisms produce insulin using controlled nutrients, followed by purification to remove impurities and increase product purity. The purified product is freeze-dried before entering formulation, filling, inspection, and packaging stages. Strict cleanroom protocols, protective clothing, and standard operating procedures are enforced to maintain safety, hygiene, and product quality.

The visit highlighted Biocon's structured lab-to-market process, where the products are developed from small-scale laboratory research to large-scale manufacturing. In the R&D department, processes are tested and optimized to generate reliable data before being transferred to production teams. Then those results are shared with manufacturing and regulatory units, including international teams in India, ensuring quality assurance, regulatory compliance, and full product traceability before market release.

Biocon integrates biology, computing, and data analytics to support efficient biopharmaceutical manufacturing. R&D activities focus on small-scale process development and optimization. The manufacturing process includes upstream fermentation using Pichia pastoris platform, downstream purification, and crystallisation to produce the drug substance, which is then formulated, filled, inspected, and packaged under strict quality controls. Computing systems, automation, and secure data management enhance process monitoring, contamination detection, and regulatory compliance. This integration of technology and biology ensures high product quality and continuous innovation at Biocon.

Computing and information systems play a vital role in supporting Biocon's biotechnology operations by improving efficiency, accuracy, and reliability. Many manufacturing processes are managed through computer-assisted systems with screen-based interfaces that allow real-time monitoring of fermentation, purification, and production parameters.

Data from upstream and downstream stages is collected and analyzed using centralized databases to support quality control, yield optimization, and maintenance planning. Automation and robotic systems are used in processes such as filling, inspection, and packaging, while machine monitoring systems help ensure continuous operation. All production and testing data is securely stored on company servers with regular backups performed by the IT team, ensuring data integrity, traceability, and regulatory compliance.

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**UMAIRAH NASUHA BT KAMARUDIN (A25CS0371)**

**FADHIL ATHA RAMADHAN (A24CS4093)**

**ZAKY ZULHADI (A24CS4097)**

**TAN JUN CHEN (A25CS0141)**

# Industrial Operations and Technical Insights



# Conclusion, Acknowledge, and Career

From a technical perspective, the visit enhanced the understanding of industrial-scale fermentation, purification processes, contamination control, waste management, and strict cleanroom protocols with full PPE to ensure product safety and quality.

The experience also highlighted the importance of soft skills such as communication, teamwork, and professionalism within a diverse and competitive work environment. Structured workflows, quality checks, and third-party audits emphasized discipline and continuous improvement.

The visit also highlighted the real-world application of computing and IT systems in data analytics, process monitoring, automation, and regulatory support. It also increased the awareness of the importance of interdisciplinary collaboration among IT, biology, and engineering teams in ensuring product quality, safety, and compliance with international standards.

In Conclusion, The visit emphasized the critical importance of network security and computing systems in modern biotechnology. From monitoring fermentation parameters to managing centralized databases and automated packaging lines, students saw how secure networks and robust IT frameworks underpin every stage of production. This experience reinforced the value of interdisciplinary skills, preparing students for roles where cybersecurity meets industrial automation.

For students specializing in Computer Network and Security, this industrial visit provided valuable insight into the critical role of secure IT infrastructure and networking within biopharmaceutical manufacturing. The visit highlighted how advanced technologies such as real-time monitoring systems, machine-to-machine communication, and data encryption are employed to ensure operational reliability and strict regulatory compliance. This exposure underscores the importance of cybersecurity in industrial environments and opens pathways to careers in industrial cybersecurity, secure automation systems, and IT governance within healthcare and biotechnology sectors. It further reflects the growing demand for professionals equipped to safeguard sensitive production processes and confidential patient-related data in a highly regulated industry.

## REPORTED BY :

**ZAKY ZULHADI (A24CS4097)**

**UMAIRAH NASUHA BT KAMARUDIN**

**(A25CS0371)**

**FADHIL ATHA RAMADHAN (A24CS4093)**

**TAN JUN CHEN (A25CS0141)**



We sincerely **thank Biocon Sdn Bhd** for providing this unique learning opportunity and sharing insights into their secure and technology-driven operations. Special appreciation goes to the lecturers Especially To **Assoc. Prof. Dr. Azurah binti A Samah**, organizers, and staff who made this visit possible, ensuring students gained practical knowledge that complements their academic learning.