

Industry Visit to Biocon Sdn Bhd :

from code to cure , connecting biotechnology with computing innovation

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INTRODUCTION

This is a newsletter report on an industrial visit to Biocon Sdn.Bhd, a leading biotechnology company that is specializing in insulin manufacturing. This visit was conducted on 23rd December 2025 at Biocon's facility in gelang patah.

The purpose of this visit was to expose students to the real world biotechnology operations and to understand how computing systems support pharmaceutical manufacturing process. Through the visit, students were able to observe how advanced technologies, automation and information system support the large scale biotechnological processes.

This visit is closely related to the Bachelor of Computer Science (Bioinformatics) programme in UTM as it highlights the integration of biological science with computing and information systems in biotech industry. Through this exposure, students gained clearer insight into potential career pathways where bioinformatics, industrial computing and biotechnology intersect the healthcare industry



<https://www.biocon.com/more/biocon-malaysia/>

-APPLYING COMPUTING SYSTEMS IN LARGE SCALE INSULIN MANUFACTURING -



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OBJECTIVES OF THE INDUSTRY VISIT

The industrial visit to Biocon Sdn Bhd was conducted with several specific learning objectives aimed at enhancing students technical understanding and industry awareness.

The primary objectives was to provide students with direct exposure to real world biotechnology and pharmaceutical manufacturing operations. By observing it in reality, students were able to understand how biological processes are scaled from laboratory research to a commercial production.

The visit also aimed to help students observe the lab-to-market process, including how research outcomes are translated into market ready healthcare products. In this case, it is insulin. This includes understanding quality control procedures, data recording procedures.

Finally, the visit aimed to connect academic knowledge with industry practice, enabling students to see how concepts the concepts applied in real world. This experiences enhance students career readiness by offering insight into potential roles in biotechnology, manufacturing and healthcare technology.

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BIOTECHNOLOGY OPERATIONS OBSERVED

During our industrial visit to Biocon, we were introduced to the R&D environment, which mainly operates as wet laboratory where cells and microorganisms are handles under controlled condition like they use specific pH to monitor the culture medium and adjust the pH to keep cells healthy.

Then we also learn about the upstream process, including cell culture and fermentation. The cells are stored at around -80-degree Celsius and later grown in fermenters, with continuous data monitoring to optimize production. The harvesting stage involves centrifugation processes such as fragmentation, harvesting and cell separation. Analytics team overview the steps from upstream to downstream to ensure quality standards are met.

In the downstream process, the focus is on purification to obtain products like insulin. This includes enzymes reactions using trypsin and both small- and large-scale analyses for quality verification.

Overall, the visit showed how biotechnology processes and computing system work together in producing high quality biopharmaceutical products.



https://archive.biocon.com/biocon_aboutus_biomalaysia.asp

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<https://www.empr.com/home/news/semglee-insulin-glargine-injection-type-1-2-diabetes/>

LAB-TO-MARKET TRANSLATION

The transition from using yeast to producing a life-changing medicine is no easy process. Firstly, it starts in the lab with a methylated precursor, which is a <https://www.biocon.com/news-biocon/image-gallery-biocon/manufacturing-locations/>



ROLE OF COMPUTING & INFORMATION SYSTEMS

During our visit to Biocon, we observed that computing and information systems play a crucial role in supporting biotechnology operations at every stage of production. Computer-aided manufacturing systems monitor fermentation parameters such as temperature, pH, and cell growth using real-time data from sensors. This enables operators to quickly adjust conditions and maintain optimal performance.

Biocon also relies on resource planning systems to efficiently manage raw materials, laboratory supplies, and production schedules. For quality control, test and analysis results are recorded digitally and stored in databases, ensuring accurate tracking and adherence to standards. Furthermore, machine monitoring and maintenance systems help identify equipment problems early, enhancing safety, reducing downtime, and ensuring consistent product quality.



https://archive.biocon.com/biocon_aboutus_biomalaysia.asp



<https://www.bioconbiologics.com/about-us-draft/our-legacy/>



<https://www.biospectrumindia.com/>

INTEGRATION OF COMPUTING, NETWORKS & BIOLOGY



<https://www.computersciencedegreehub.com/faq/what-is-computational-biology/>

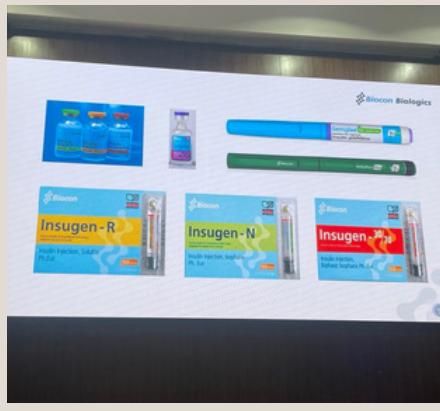
At Biocon, it is impossible to segregate the biological process from its computer systems that regulate it. Biocon operates as a "digital nervous system," where lab equipment and production machinery are comprehensively interconnected as a unified computer network. This allows Biocon to achieve 98% automation at its plant and shift from using paper records to EBRs. These computer systems perform three very important functions:

Automatic Control : Thousands of sensors are continuously monitored by the SCADA system to guarantee the "Golden Batch" criteria for temperature and pH level are achieved with complete accuracy on the first batch and with no manual intervention.

Data Integrity : Since all the laboratory equipment is networked, the test results directly enter the LIMS (Laboratory Information Management System), eliminating all chances of data manipulation and providing a full traceability level of 100 percent.

Operational Efficiency : By utilizing Enterprise Resource Planning tools, it is able to coordinate the production of raw methylated precursors and the production of the final API powder, thus sustaining a continuous workflow from the warehouse to the international markets.

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KEY OUTCOMES

One of the key outcomes was gaining new knowledge about biopharmaceutical manufacturing, particularly in the production of biosimilars and the importance of quality control in ensuring product safety and effectiveness.

Additionally, students developed a clearer understanding of how computing concepts are applied in real-world industrial settings, such as data monitoring, automation systems, and digital process control used in manufacturing operations. The visit also increased awareness of interdisciplinary collaboration, where information technology, biology, and engineering work together to support complex biotechnological processes.

SKILLS AND KNOWLEDGE DEVELOPMENT

Through the industrial visit, students were exposed to various technical skills and industrial practices, including the use of automated systems, data-driven decision-making, and adherence to Good Manufacturing Practices (GMP). Although we did not directly operate the systems, but by observing these technologies it helped us build foundational technical awareness relevant to our studies.

In terms of soft skills, I'm honoured to be the representative for this visit as it teach me how to be confident and talk about what I gain in this visit and thanked the staff. Other student also gain the opportunity to talk and ask question to the PIC that guides as for the tour around Biocon.

The visit emphasized the importance of communication, teamwork, and professionalism in an industrial environment. Interactions with industry professionals highlighted how effective collaboration and clear communication are essential in maintaining operational efficiency and compliance. Furthermore, students gained awareness of industrial standards, safety protocols, and regulatory requirements, which are critical in the biotechnology and pharmaceutical sectors.



<https://www.biocon.com/news-biocon/image-gallery-biocon/company-logos-2/>

RELEVANCE TO ACADEMIC STUDIES & CAREER



23rd December 2025

The visit strongly connected theoretical knowledge from coursework to practical applications in industry. Concepts learned in subjects related to computing, data management, systems analysis, and technology integration were observed being applied in real manufacturing and monitoring environments. This exposure enhanced students' career awareness by providing insight into potential roles within the biotechnology and biopharmaceutical industries. It also sparked interest in career pathways such as biotechnology, computing, industrial IT systems, and data analytics, helping students to understand better how their academic background can be applied in diverse and interdisciplinary fields. So that they can plan their career path according to information that they gain from this visit.

CONCLUSION

In conclusion, the visit to Biocon Sdn. Bhd. was a valuable and enriching experience that broadened students' perspectives on the biotechnology industry. The visit successfully demonstrated the integration of technology, science, and engineering in real-world applications while reinforcing the importance of quality, innovation, and compliance.

Industry exposure such as this is crucial for students as it bridges the gap between academic learning and professional practice. Overall, the visit provided practical insights, enhanced learning outcomes, and motivated students to be prepared for their future careers in technology-driven industries.

ACKNOWLEDGEMENT

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