Overview / Abstract:
New biomedical technology has brought the medical industry one step further! Instead of the conventional physical transfection method which is time-consuming and with high mortality, a new physical intracellular delivery method was discovered and could be used for transfection of macromolecules into cells. The cell scratching approach makes use of a microneedle to achieve single cell level intracellular delivery and provide automatic operation with the microfluidic chip design. The microfluidic chip is fabricated to attain continuous flow of cells, and to enable cell separation, single cell alignment and most importantly, intracellular delivery.

Discovery-enriched Curriculum (DEC) journey for the students:
In this project, the students designed a new physical method for virus-free intracellular delivery. They fabricated a suitable microfluidic chip for attaining continuous flow and also enabling cell separation and single cell aligning. Then, cells flowing out of the chip can be scratched by a microneedle. Moreover, they tried to develop and improve the approach to a high efficacy intracellular delivery method by maximising the delivery rate and cell viability and minimising cell loss, which is applicable to at least three types of cells. Through this project, the students gained the experience of solving problems by utilising knowledge learned from multi-disciplines.