Subject Description Form

Subject Code	ABCT5107
Subject Title	Advanced Therapeutic Products
Credit Value	3
Level	5
Pre-requisite	Nil
Co-requisite	Nil
Exclusion	Nil
Objectives	1. Equip students with an in-depth understanding of the principles and applications of the latest gene- and cell-based therapeutic strategies. 2. Introduce the advancements and challenges associated with mRNA vaccines and their associated delivery mechanisms. 3. Illuminate the significance of lipid nanoparticles (LNP) in ensuring the efficient delivery and stability of mRNA vaccines. 4. Foster a comprehensive perspective on the potential clinical impacts and innovations in the realm of advanced therapeutic products.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) elucidate the fundamental concepts, methodologies, and applications of gene- and cell-based therapeutics in modern medicine. b) distinguish between different types of gene therapies, including CRISPR-Cas9, RNA interference, and antisense oligonucleotides, and their respective applications. c) examine the principles and mechanisms of cell-based therapies, including CAR-T cell therapy and stem cell treatments, and their potential therapeutic implications. d) understand and evaluate the role of lipid nanoparticles (LNP) in the formulation and delivery of mRNA vaccines, exploring their advantages, challenges, and future potential. e) analyze and critically evaluate a range of drug delivery technologies, deepening understanding of their design intricacies, functional mechanisms, and appropriateness for specific therapeutic contexts.

Subject Synopsis/ Indicative Syllabus	1. **Introduction to Advanced Therapeutic Products** (3 hours) - Overview of the therapeutic landscape - Historical perspective and the rise of gene and cell therapies 2. **Fundamentals of Gene Therapies** (3 hours) - Basic concepts and methodologies - Different types of gene therapies: CRISPR-Cas9, RNA interference, and antisense oligonucleotides 3. **Cell-based Therapeutic Strategies** (3 hours) - Principles of cell therapies - Spotlight on CAR-T cell therapy and stem cell treatments 4. **mRNA Vaccines and their Revolution** (3 hours) - Introduction to mRNA vaccines - Mechanisms, advantages, and challenges 5. **Lipid Nanoparticles (LNP) in mRNA Vaccine Delivery** (3 hours) - Fundamentals of LNPs - Role in mRNA vaccine formulation and delivery 6. **Diverse Drug Delivery Technologies** (3 hours) - Exploring various delivery systems - Design principles, operational mechanisms, and therapeutic applications 7. **Safety and Efficacy of Advanced Therapeutic Products** (3 hours) - Clinical trial data and real-world implications - Regulatory considerations 8. **Future Trends and Innovations** (3 hours) - Predicting the next wave in gene and cell therapies - The role of technology and research 9. **Case Studies: Real-world Applications of Advanced Therapeutic Products** (3 hours) - Analyzing success stories and challenges - Lessons learned and future potential 10. **Ethical and Societal Implications of Advanced Therapies** (3 hours) - Navigating the ethical landscape - Societal impacts and considerations 11. **Regulations of ATP in Hong Kong** (3 hours) 12. **Tutorials** (6 hours)
Teaching/Learning Methodology	Lectures, assignments, mid-term examination, examination 1. Attendance – Students are expected to attend at least 80% of both the lecture and tutorial classes.

	2. Written assignments – Case Study Analyses: Given real-world scenarios or cases, students will analyze, draw conclusions, and suggest potential solutions or strategies. 3. Mid-term examination - Written exam covering the first half of the syllabus with mix of MCQ and short answers, and essay-type questions. It serves as an interim evaluation and helps students gauge their understanding midway through the course. 4. Examination - A comprehensive written exam covering the entire syllabus that consists of multiple-choice, short answer, and essay-type questions, but with a focus on integrating knowledge throughout the course.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% (weighting)	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
1. Attendance	10		√		√	
2. Written Assignments	20	√		√		√
3. Mid-term examination	25	√	√	√	√	√
4. Examination	45	√	√	√	√	√
Total	100 %					

Students are allowed to use GenAI tools to support their writing of and essays. If GenAI tools are used to support their essay writings, students must declare the use of such tools and how they have been used in the assessments. It should be noted that submitting a work generated by GenAI, in part or in whole, as your own (even in paraphrased form) constitutes an act of academic dishonesty; it is no different from asking another person to write your assignment or claiming others' ideas as yours.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.

	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Assignment	20 Hrs.
	▪ Mid-term and examination	60 Hrs.
	Total student study effort	119 Hrs
Reading List and References	"Advanced Therapy Medicinal Products: From Bench to Bedside" by Marianna Keymeulen and Gunther Hartmann. "Regenerative Medicine: From Protocol to Patient" by Gustav Steinhoff and Doris Taylor "Gene and Cell Therapy: Therapeutic Mechanisms and Strategies" by Nancy Smyth Templeton and Patrick Aebischer	