開課班級: 碩動疫科技二A **授課老師: 楊忠達,張立鑫** **學分數: 3**

課程大綱:

課程以介紹疫苗產業相關應用技術為主。將討論產業裡研發，生產，品管過程會運用上之相關技術。也以經濟角度來探討疫苗產業之價值鏈。

outline:

Have you ever wondered how your body fights off a cold, why vaccines work, or what lies behind the headlines of breakthrough cancer therapies? This course provides an accessible introduction to the fascinating world of immunology, the science of our body's defense system. We will embark on a journey that begins with understanding the fundamental "soldiers" and "command centers" of our immune army—from the front-line police of the innate response to the elite special forces of adaptive immunity. Once we've met the key players, we will explore the essential "reconnaissance tools" that scientists use to investigate this invisible world. We will demystify core laboratory techniques like ELISA, Western Blot, and Flow Cytometry, understanding not just how they work, but what critical questions they help us answer. Finally, we will connect this knowledge to the real world, tracing the path from a scientific discovery in the lab to a product on the shelf. We will analyze the technology behind COVID-19 rapid tests, vaccine efficacy trials, and revolutionary "living drugs" like CAR-T cell therapy and mRNA vaccines.

教學型態:

課堂教學

成績考核方式:

平時成績:30%
期中考:35%
期末考:0%
其它:Final Presentation: 35%%

本科目教學目標:

Upon successful completion of this course, students will be able to: 1. Describe the Fundamental Principles of Immunology: – Differentiate between the innate and adaptive immune systems. – Identify the primary roles of key immune cells, such as T-cells, B-cells, macrophages, and dendritic cells. – Explain the function of antibodies and the concept of immunological memory. 2. Explain the Core Principles of Immunological Techniques: – Explain how methods like ELISA and Western Blot are used to detect and identify specific proteins like antigens and antibodies. – Describe how Flow Cytometry is used to count and classify different cell populations. – Explain the purpose of Immunohistochemistry (IHC) in visualizing molecules within tissues. 3. Connect Scientific Methods to Industrial Applications: – Associate specific laboratory techniques with their real-world applications in medical diagnostics, such as rapid tests and disease screening. – Explain how immunological assays are used to evaluate the effectiveness of vaccines in clinical trials. – Articulate the role of quality control methods in ensuring the safety and purity of biologic drugs. 4. Recognize Modern Advances in Immunotherapy: – Identify the basic concepts behind major therapeutic platforms, including monoclonal antibodies, CAR-T cell therapy, and mRNA technology. – Discuss the potential and challenges of these emerging technologies in treating diseases like cancer and autoimmune disorders.

參考書目:

課程進度表：

週次	起訖月日	授課單元(內容)	備註
第1週	9.08~9.15	An Introduction to the Immune System	8日正式上課。8~12日課程加退選，轉學(系)生、復學生及延修生選課，雙主修、輔系申請，12日申辦抵免學分截止日
第2週	9.15~9.22	The First Responders: Innate Immune System	
第3週	9.22~9.29	Special Forces (Part 1): T-Cells	28日(日)孔子誕辰紀念日/教師節(放假),29日(一)補假
第4週	9.29~10.06	Special Forces (Part 2): B-Cells & Antibodies	29日成績優異提前畢業者提出申請截止日
第5週	10.06~10.13	Basic Technique: ELISA	6日(一)中秋節(放假)，10日(五)國慶日(放假)
第6週	10.13~10.20	Basic Technique: Western Blot	14日學生宿舍安全輔導暨複合式防災疏散演練。18日多益測驗
第7週	10.20~10.27	A Cellular Roll Call: Flow Cytometry	24日(五)補假，25日(六)光復暨古寧頭大捷日(放假)。
第8週	10.27~11.03	A Treasure Map of Tissues: Immunohistochemistry (IHC)	30日校課程委員會
第9週	11.03~11.10	Mid-term	3~9日期中考試
第10週	11.10~11.17	Sentinels of Disease: Diagnostic Kit Development	13日教務會議,16日教師期中成績上網登錄截止日
第11週	11.17~11.24	Therapeutic Monoclonal Antibodies	
第12週	11.24~12.01	Engineered Immune Soldiers: CAR-T	24~28體育運動週。24日校園路跑。27日運動大會夜間開幕，28日運動大會活動，29日101週年校慶活動日，照常上班
第13週	12.01~12.08	When Immunity Goes Wrong：Leukemia & Autoimmune disease	
第14週	12.08~12.15	Neuroinflammation	12日申請停修課程截止日
第15週	12.15~12.22	The mRNA Vaccine Technology Platform	
第16週	12.22~12.29	The Future of Immunology：AI & Immunoinformatics	22日校務會議。25日行憲紀念日(放假)
第17週	12.29~1.05	Presentation	1日(四)開國紀念日(放假)
第18週	1.05~1.12		5~11日期末考試，10~11日學生退宿