Institute of Microbiology and Molecular Genetics
Faculty of Life Sciences
University of the Punjab, Lahore

Course Outline

Programme	BS	Course Code	MMG411	Credit Hours	3
Course Title	**VACCINOLOGY**				

COURSE INTRODUCTION

The Course aims to provide a comprehensive overview of Vaccines and its types. It covers a wide range of aspects, from basic immunology, the process of pre-clinical and clinical vaccine development, licensure and regulatory requirements, vaccine trials, translation of research into policy to the introduction of a new vaccine into an immunization program and communication with the society.

LEARNING OUTCOMES

On the completion of the course, the students will be able to:

1. Understand and describe the immune system and immunology as it applies to vaccines and vaccination.
2. Understand the various types of vaccines and risk communication in today's society.
3. Demonstrate an understanding of the processes of vaccine development and manufacture
4. Understand the Pakistan Immunization Program.

COURSE CONTENT

Introduction to Vaccinology: Definition and significance of vaccines, role of immunology in the field of vaccinology, Historical milestones in the field of vaccinology, Types of vaccines: Inactivated vaccines, Live-attenuated vaccines, Messenger RNA (mRNA) vaccines, Subunit, recombinant, polysaccharide, and conjugate vaccines, Toxoid vaccines, Viral vector vaccines, Vaccine design to clinical steps: Exploratory – Research, Preclinical – Safety & Efficacy, Clinical – Safety & Efficacy in Humans, Regulatory Review & Approval – Licensure, Production – Scaling up, Quality Control – Performance Review, Post-Marketing, Vaccine development against major infectious diseases: Polio, Small pox, Rotavirus, Rubella, Shingles, Tetanus, Hepatitis B, COVID-19, Challenges and lessons learnt from COVID-19 pandemic: setting policy, delivering public health interventions, Pakistan Immunization program and providing effective communication.

TEXTBOOKS AND READING MATERIAL

1. Plotkin, S.A., Orenstein,W.A., Offit, P.A.2008. *Vaccines*, Elsevier Health Sciences.
2. De Quadora, & Ciro, A. (2005). *Vaccines: Preventing Disease and Protecting Health*, Pan Americas Health Organization.
3. Singh, M. (2009). *Vaccine Adjuvants and Delivery Systems.* 1st Edition, Amazon publishers.
4. Ashfield, R., Oli, A. N., Esimone, C., & Anagu, L. O. (2022). *Vaccinology and Methods in Vaccine Research*. Elsevier.
5. Parag Kolhe, P., and Ohtake, S., (2021). *Practical Aspects of Vaccine Development.* Elsevier.

ASSESSMENT

Sr. No.	Elements	Weightage	Details

1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on activities, short tests, projects, practicals, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, fieldwork , report writing etc.