MICROBIOLOGY, IMMUNOLOGY AND PATHOLOGY (GMT 104)

NO	TOPIC/SUBTOPIC	LECTURE	PRACTICAL	OTHER TEACHING MODE	DEPARTMENT	LEARNING OUTCOME By the end of the course, students will be able to:
	Microbiology					
1.	Classification of medically important bacteria	√			MICROBIOLOGY	Describe the general concepts in the classification of medically important bacteria Describe the basic structure and classification of Gram positive and Gram negative bacteria Describe the principle of Gram staining and relate to bacterial cell wall composition Able to list common examples of Gram positive and Gram negative bacteria
2.	Classification & development of medically important fungi	√			MICROBIOLOGY	Describe the general concepts in the classification of medically important fungi Describe the basic structure for identification of fungi Able to list common examples of fungi (yeast and mold)
3.	Classification and replication of viruses	√			MICROBIOLOGY	Describe the basic structures in the identification of viruses Describe viral replication and understand the importance of various steps involved Describe growth requirements for viral replication
4.	Microscopic examination of bacteria and fungi	√			MICROBIOLOGY	Describe the basic structures in the identification of Chlamydophila, Mycoplasma, Spirochaetes and Mycobacterium Able to list common examples of Chlamydophila, Mycoplasma, Spirochaetes and Mycobacterium Describe the principle of Ziehl-Neelsen staining and relate to bacterial cell wall composition
5.	Microbial genetics and principles of antimicrobial resistance mechanisms	√			MICROBIOLOGY	Give an overview of microbial genetics of the followings 1. Compare prokaryotic and eukaryotic genome 2. Properties of bacterial genome with respect to • Size • Gene organizations • Extrachromososmal genetic elements • Transformation • Conjugation and • Transduction 3. describe the mechanisms of antimicrobial resistance
6.	Host- pathogen interactions	√		√ (PBL)	MICROBIOLOGY	1. Describe the • Host sites with normal flora • Types of normal flora • Role of normal flora in the maintenance of health • Concept of symbiosis and commensalism • Immune response to infections 2. Discuss on host-pathogen interactions on the followings • Host and pathogen definition • Concept of host and pathogen relationship • Pathogen escape mechanisms 3. Recall the pathogenicity and virulence factor of micro-organisms

7.	Staining techniques and microscopic examination		√		MICROBIOLOGY	1. Understand and adhere to laboratory safety during the microbiological procedure 2. Understand the principles of staining technique (Gram-stain, Ziehl-Neelsen stain, India ink, LPCB) 3. Able to perform the staining techniques 4. Able to examine microscopically (shape, arrangement, staining reaction) and interprete the staining performed
8.	Transport media, growth and microbial culture		√		MICROBIOLOGY	1. Describe the basic growth requirements for bacteria, fungi and viruses 2. Describe the types and usage of culture media for each of the microorganisms 3. Describe the bacterial colony morphology and characteristic (fermentation, pigmentation, type of hemolysis) on culture plates 4. Able to differentiate between yeast and mold based on fungal colony morphology and characteristic 5. Able to appreciate viral cytopathic effects of infected cells in cell culture
9.	Pathogenicity and virulence	√			MICROBIOLOGY	Describe the pathogenicity and virulence factor of micro-organisms
	Immunology					
10.	Introduction to Immunology	√			IMMUNOLOGY	Describe the features and characteristics of the immune system including 1) innate immunity 2) adaptive immunity 3) cells and mediators of the immune system
11.	Cells & organs of the Immune System	√			IMMUNOLOGY	Describe the functions of 1) Primary and secondary lymphoid organs 2) Lymphocyte subsets
12.	T & B Cell Development	√			IMMUNOLOGY	Describe the development process of 1) T cells 2) B cells
13.	Complement & cytokines	√			IMMUNOLOGY	Describe the components, biological functions and role in health and disease of 1) complement 2) cytokines
14.	Non-specific defense	√			IMMUNOLOGY	Describe and characterise the following with regards to immune function 3.1 mononuclear phagocytes 3.2 antigen presenting cells 3.3 granulocytes
15.	Structure and functions of immunoglobulin	√			IMMUNOLOGY	Describe 8.1 antibody structure 8.2 antibody function 8.3 classes and subclasses of immunoglobulin
16.	Major histocompatibility complex	√			IMMUNOLOGY	Describe 8.4 MHC structure 8.5 MHC functions
17.	Immune response and regulation	√			IMMUNOLOGY	Describe 1) Humoral and cell mediated immune response 2) Complemet mediated lysis, opsonisation, ADCC 3) Immunosuppression and immunotolerance.
18.	Principle of antigen & antibody interactions	√		√ (PBL)	IMMUNOLOGY	1) Discuss the pathophysiology of autoimmune disease: a. Autoantigens and autoantibodies b. Autoimmune diseases c. Immunologic tolerance d. Clinical presentation

						2) Discuss the patient's and the parents' emotions 3) Understand principles of the tests and their interpretations
19.	Immunopathology and Abnormalities of the Immune System	√			IMMUNOLOGY	Describe 1) 4 different types of hypersensitivity reactions (Type I-IV) 2) Different types of immunodeficiency and immune diseases
20.	Principles of Immunization	√			IMMUNOLOGY	Describe 1) Active and passive immunizations 2) Types of vaccines 3) Use of adjuvants in immunization 4) Problems inimmunization 5) Extended Program of Immunization (EPI) in Malaysia
21.	Principles of Tolerance & Autoimmunity	√			IMMUNOLOGY	Describe 1) The mechanisms of immune tolerance 2) Pathological implications of the failure of immune tolerance
22.	Introduction to Clinical Immunology	√			IMMUNOLOGY	Describe 1) Hypersensitivity, immunodeficiency, autoimmunity & immune complex diseases 2) Transplantation immunology 3) Immunosupression and immunomodulation
23.	Immunological tests		√		IMMUNOLOGY	1) Read and interprete the results of different types of immunoprecipitation tests (double radial immunodiffusion and single radial immunodiffusion) 2) Perform Urine Pregnancy Test 3) Read and interprete the results of haemagglutination and latex agglutination, immunoflourescence and Enzyme-linked Immunosorbent assays (ELISA)
	Pathology					
24.	Acute inflammation	√		√ (PBL)	PATHOLOGY	a) identify acute inflammation in the clinical scenario b) discuss the mechanism of acute inflammation in relation to the clinical scenario c) discuss the sequelae of acute inflammation d) discuss the importance of inflammation as a part of healing process e) discuss ethical issue in the clinical intervention
25.	Chronic inflammation	√			PATHOLOGY	a) list the factors causing chronic inflammation b) understand the mechanism of chronic inflammation including the chemical mediators c) understand the morphological changes of chronic inflammation at tissue and cellular level d) understand different types of granulomatous reactions in chronic inflammation e) understand the complications of chronic inflammation such as fistula formation, risk of cancer development, etc f) understand the differences and similarities between acute and chronic inflammation g) understand type IV hypersensitivity

26.	Tissue Healing and Repair	√			PATHOLOGY	a) understand the different types of wound healing b) list factors that promote healing c) understand extracellular matrix and cell-matrix interactions d) understand granulation tissue formation e) understand the process of fibrosis f) understand the mechanism of healing and repair in epithelium and mesenchymal tissues g) co-relate healing and repair with inflammation.
27.	Epidemiology, nomenclature & characteristics of tumor	√			PATHOLOGY	a) Define neoplasia b) Understand the epidemiology of tumours c) Classify tumours based on its' nomenclature d) Understand tumour behaviour-differences benign & malignant e) Understand different modes of tumour spread
28.	Clinical aspects of tumours and host defense against tumours	√			PATHOLOGY	a) Understand clinical features of tumours b) Understanding grading and staging of tumour c) Understand paraneoplastic syndromes d) Understand laboratory diagnosis of cancer e) List tumour antigens f) Understand antitumour effectors mechanisms g) Understand immune surveillance and escape
29.	Carcinogenic agents and cellular interaction	√			PATHOLOGY	a) Understand the terminology of carcinogenesis b) Understand various carcinogenic agents c) Understand the multisteps multifactorial theories of cancer using colorectal adenoma and carcinoma as an example
30.	Molecular Basis of Neoplasia I: Oncogene & Tumour Suppressor Genes	√			PATHOLOGY	a) Recall normal cell cycle b) Understand the hallmark of cancer c) Understand the essential alterations for malignant transformation d) understand self-sufficiency in growth signals:Oncogenes e) understand and list proto-oncogenes, oncogenes & oncoproteins f) understand alterations in nonreceptor tyrosine kinases g) understand Tumour suppressor genes and their functions h) understand limitless replicative potential: Telomerase
31.	Molecular basis of Neoplasia II: Angiogenesis, metastasis and stromal microenviroments of tumors	√			PATHOLOGY	a) Understand angiogenesis b) Understand invasion & metastasis c) Understand stromal microenvironment and its relation to carcinogenesis
32.	Oedema & congestion	√			PATHOLOGY	a) Define and classify oedema b) Understand pathophysiology of oedema based on categories c) Understand the pathological features in oedematous organs d) Understand the clinicopathological correlation of oedema e) Define congestion and hyperemia f) Understand the mechanism of hyperaemia and congestion

						g) Understand the clinicopathological correlation of hyperemia and congestion h) Define shock i) Classify shock based on the pathophysiology j) Understand the different stages of shock k) Understand the pathological features of shock in various organs l) Understand the clinicopathological correlation
33.	Thromboembolic disorder	√			PATHOLOGY	a) Define thrombosis, embolism, infarction and their clinicopathological correlation. b) Understand the different types and pathology of embolism c) Understand thrombogenesis d) Differentiate venous from arterial thrombosis and their clinical differences e) Understand pathological features of various thrombi and to differentiate it from postmortem clot. f) Differentiate venous from arterial infarction and their clinical differences g) Recognise gross and histological features of various types of infarction
34.	Neoplasia		√			Recognize the morphological and histological changes of acute and chronic inflammation at tissue and cellular levels for example acute appendicitis, granulomatous lesions. Recognise the morphological changes of benign & malignant tumours at tissue and cellular level for example breast carcinoma vs breast fibroadenoma.
35.	Introduction to pathophysiology	√			PHYSIOLOGY	Define with regard to terms in pathophysiology Differentiate between general pathophysiology special organ or system pathophysiology Understand the importance of pathophysiology Describe the basic concept with regard to pathophysiology of signs and symptoms

Guided Self Learning

NO.	TOPIC/SUBTOPIC	DEPARTMENT	LEARNING OUTCOME By the end of the course, students will be able to:
1.	Neoplasia	PATHOLOGY	1) Understand how tumour develops at cellular and tissue levels 2) Understand the molecular mechanism of tumour development 3) Understand the various types of tumour