Course Code: MLC404 **Course Title: Clinical Pathology & Histology**
Number of Credits: 3T + 2P = 5
Effective from AY: 2022 -2023

Prerequisite for the Course:	Basic knowledge of Anatomy and Physiology.	
Objectives:	• Learning techniques of collection of samples such as body fluids and tissues for studying cytological aspects. • Hands-on training in learning techniques of processing the tissue samples for further analyses and treatment of particular diseases.	
Content:	**Module 1: Histopathological techniques** Fixatives and fixation, Preparation of fixatives , Neutral formalin, buffered formalin, mercuric Zenker's sol. Schaudinns sol, k-dichromate- orth's solution Regaud's sol picric acid – Bouins sol: Hollande's sol. clearing, embedding, microtome knives, section cutting, errors, decalcification, Decalcifying fluids, formic acid, gooding & stewarts fluid, nitric acid, aqueous nitric acid. frozen section, mounting media, automation. Staining: Theory of staining, dyes and stains, mordants, differentiation, haematoxylin and eosin staining- principles and procedures, Hematoxylin stains: composition and techniques preparations & application of , iron hematoxylins , weigert's iron hematoxylin, heidenhains iron hematoxylin. Tungsten Hematoxylins , PTAH, Molybdenum Hematoxylin , phophomdybdic acid hematoxylin. special stains, carbohydrate stins and glycoconjugates, P.A.S. alcian blue techniques combine alcian blue – PAS , muciccarmine , colloidal iron, high iron diamine. Lipid staions, oil red o , suddan black b., pigments and minerals perls pursian blue for ferric iron , masson Fontana method for melanin, von kossa for calcium.elastic tissue stains, weigert method, Verhoff's,method Connective tissue stains, history of connective tissue composition preparation and application of Masson's trichrome, Von Giessons, Reticulin stain Gomoris silver methanamine. fat stains, and other stains. Microorganism , Grams method & modified method , Z N stains for mycobacteria, fluorescent method for mycobacteria, modified fite method for mycobacteria leprac, cresyl violet stains for helicobacter, grocott methamine silver for fungi, Mc manus PAS method for glycogen & fungal wall, Amyloid congo red techniques. **Module 2: Examination of body fluids** Sample collection, physical and chemical tests, principles and	15hrs 15hrs

	methods, reagent strip method, microscopic examination- crystals, casts, sediments, pregnancy tests. Stool examination, semen analysis, sputum examination. Cytocentrifugation and application Lab diagnosis/ urine/ blood/ findings in kidney disorders. **Module 3: Cytological techniques** Exfoliative cytology, fixation, pap staining, cytological processing of fluids. Fine needle aspiration cytology (FNAC): procedure, staining of slides, automation, H & E and MGG staining. Examination of CSF and other body fluids: pleural, peritoneal, synovial fluid. Quality control in clinical pathology lab, automation in clinical pathology lab. enzyme histochemistry and its diagnostic application, immuno histochemicals techniques, tissue microarray, molecular pathology techniques In situ hybridation/ F.I.S.H **Practical Module:** • Histopathological techniques: fixation, dehydration, clearing, impregnation, embedding, decalcification.microtome's , base sledge, rocking type, rortary, sliding microtome, autotechnicon automated tissue processor, principle, working, paraffin embedding bath etc. • Microtomes knives and their sharpening, automated knives sharpners section cutting, errors in section cutting,refregirated micotome, freezing micotome , cryostat etc. frozen sectioning, mounting media. • Routine staining techniques: routine staining, hematoxylin and eosin (H &E) staining. • Special staining demonstration: P.A.S., Verhoeff's, Massons trichrome, Von Giessons, fat stains and other stains. • Grossing and Museum techniques. • Examination of urine: Physical and chemical. • Examination of urine: multiple reagent strips methods, microscopic.Urinometer, ESbach's Albuminometer, automated urine analyser, dipstick readers etc. • Pregnancy tests. • C.S.F. examination • Examination of body cavity fluids: pleural, peritoneal, and synovial. • Sputum examination • Stool examination • Semen analysis. • Exfoliative cytology: principles, Papanicolaou staining procedure.	15 hrs 30 hrs x 2

	• Fine needle aspiration cytology (F.N.A.C): hematoxylin and eosin (H &E), MGG staining. • Needles lumbar puncture needle, vim silverman needle, bone marrow aspiration biopsy needle, trephine biopsy needle etc. • Miroscopes, compound, dark ground illumination, phase contrast, fluroscent microscopy, polarizing microscopy.	
Pedagogy:	Lectures/tutorials/assignments/ Presentations/Practicals/ demonstrations.	
Learning Outcome:	By the end of this course, students will be able to 1. Describe and demonstrate staining techniques for pathological evaluations. 2. Explain different techniques used for examining body fluids. 3. Process tissue and Perform histopathological techniques. 4. Examine body sample for pathological analysis.	
References	1. Lieberman MA and Ricer R(2019). BRS Biochemistry, Molecular. 2. Kawthalkar SM(2018). Essential of Clinical Pathology. Second Edition. Jaypee Medical publishers, New Delhi. 3. Vasudev DM(2013): Textbook of Biochemistry for medical student's seventh edition Jaypee Brothers Medical Publishers Pvt Ltd, New Delhi. 4. Sood R(1985) first edition: Medical Laboratory Technology, Jaypee Brothers Medical Publishers Pvt Ltd, New Delhi. 5. Chakraborty P(1995): A text book of microbiology, New Central Book Agency Pvt Ltd, Calcutta. 6. Dereck AC and Cameron IR(2012). Histopathology Specimens: Clinical, Pathological and Laboratory Aspects. Springer publication. REFERENCE BOOKS FOR PRACTICAL: 7. Mohan H(2017).Practical pathology. Jaypee Medical publishers, New Delhi. 8. Mukherjee KL (2017) Volume II: Medical Laboratory Technology, Tata McGraw-Hll Publishing Company Ltd. New Delhi. 9. Chatterjee MN (2013): Textbook of Medical Biochemistry eight edition: Jaypee Brothers Medical Publishers Pvt Ltd, New Delhi.	