COURSES DESCRIPTION

(*Comprehensive Track in Medical Analysis*)

Course No.	Course Description	Credit Hours
50305821	**Advanced Clinical Chemistry** This course will address advanced topics in clinical chemistry and laboratory data management and applications. It will discuss recent developments, advanced applications and instruments used in clinical chemistry. It is a combined lecture and laboratory course covering the fundamentals of clinical chemistry and relationship with diseases and the basics of diseases diagnosis especially that related to metabolism, proteins synthesis, enzymes, hormones, blood electrolytes, acid-base balance, blood gases, carbohydrates, fats, nitrogen products, calcium and phosphate, testis and kidney and liver functions, and other main tests in clinical chemistry will be demonstrated. This course also seeks to develop the student's competence in dealing with pathological samples and interpreting laboratory results. **Prerequisite:** None **Text Book:** William, J.M., Stephen, K.B. 2016. Clinical Chemistry (8thEd.) Mosby Elsever, UK **Recommended References::** 1-Bishop, M.L., Fody, E.P., Schoeff, L. 2005. Clinical Chemistry; Principles, Procedure, Correlation (6thEd.). Lippincott Williams & Wilkins. 2-Burtis, C., Ashwood, E.T. 2001. Fundamentals of Clinical Chemistry (5thEd.). W.B. Saunders. 3- Tietz, 2009 Fundamentals of clinical chemistry 6th. Ed.)	**3**
50305822	**Clinical Enzymology** This course will focus on the structure, mechanisms and biological interactions of enzymes. Binding, catalysis, rates and regulation (factors affecting their activities) will be discussed with regard to chemical principles of kinetics and reaction. The action of enzyme will be considered in the context of the biomedical role that those enzymes play. **Prerequisite:** None **Text Book:** Enzymology, Devasena, T. 2012, First edition, Oxford University Press. **Recommended References:** Fundamentals of Enzymology, The Cell and Molecular Biology of Catalytic Proteins, Price, N.C. and Stevens, L. 1999, 3th edition, Oxford University Press	**3**
50305823	**Clinical Endocrinology** A comprehensive study of the endocrine system will be studied to allow the student to integrate and better understand the functions of the other systems of the body. The relationship of the nervous system to the endocrine system is explored. Also,	**3**

	the pathological conditions and diagnostic procedures associated with endocrine imbalance are investigated. **Prerequisite:** None **Text Book:** Clinical Endocrinology, Whitehead, S. and Miell, J. 2012, First Edition, Scion Publishing Ltd. **Recommended References:** Endocrinology in Clinical Practice, Harris, P. E. and Bouloux, P.G. 2016, 2nd edition, CRC Press	
50305824	**Forensic Medical Analysis** This course introduces the student to forensic medicine analysis. The course covers a wide range of topics relevant to the subject, including forensic pathology, incident investigation, laboratory support and legal aspects. This course will focus on determining forensic substances in different biological samples including *in vivo* and *in vitro* samples. The student will be familiar with different methods of sample analysis using different techniques including molecular applications. The student also will learn to use and operate instrumentations being used for further identification, detection and conformation, and finally result interpretation. **Prerequisite:** None **Text Book:** Handbook of Forensic Toxicology for Medical Examiners, Molina, D. K. and Hargrove, V.M. 2018, 2nd edition, CRC Press **Recommended References:** Principles of Forensic Toxicology, Levine, B. 2013, 4th edition, AACC press	**3**
50305831	**Advanced Clinical Microbiology** Various topics, including; disease causation, specimen collection and handling, laboratory identification by conventional and advance molecular biology methods will be discussed in this course. The course will emphasis on pathogenic characteristics, isolation, and identification of clinical bacteria, fungi and viruses as well as some parasites related to human disease; such as respiratory, digestive and urogenital diseases in addition to blood and wound infections and opportunistic and nosocomial infections. The course focuses on the theoretical approach to the current diagnostic techniques and identification systems used in clinical practice. **Prerequisite:** None **Text Book:** Mahon CR., Lehman DC., and Manuselies G.Diagnostic Microbiology. 2011, Sanders Company **Recommended References:** 1-Forbes BA., Sahm DF., Weissfeld AS., Trevino EA. Bailey and Scotts Diagnostic Microbiology. 12th edition, 2007, Mosby Inc. 2- Sood R. Text book of Medical Laboratory Technology. 1st edition, 2006. Jaypee Brothers Ltd., New Delhi.	**3**
50305832	**Advanced Clinical Immunology and Serology** This course covers advanced topics in clinical immunology including the molecular basis of immune recognition, regulation of the immune response, mechanisms of host response against	**3**

	infectious pathogenic agents, major histocompatibility complex, cytokines, transplantation, vaccine design and immunotherapy, tumor immunology, immunodeficiency and other immune disorders. In addition, the course will cover in details various diagnostic immunological techniques. **Prerequisite:** None **Text Book:** ***Kuby Immunology.*** J. Owen, J. Punt, and S. Stranford. 2017. (7th Edition). W. H. Freeman Publishing, USA. **Recommended References:** **1-*Immunology.*** D. Male, J. Brostoff, D. Roth, and I. Roitt. Elsevier, UK, 2012 (8th edition). **2-*Cellular and Molecular Immunology*.** A. K. Abbas, A. H. Lichtman, and S. Pillai. Saunders, USA, 2017 (9th edition).	
50305833	**Infectious Diseases and Epidemiology** The course focuses on disorders caused by bacteria, viruses, fungi, protozoa and helminthes that caused infectious disease also the course will discuss the current emerging infectious diseases and the key concepts and methods of infectious diseases basic factors approaching to control and prevention of infectious diseases. **Prerequisite:** None **Text Book:** Infectious Disease Epidemiology Theory and Practice, Nelson, K. F. and Williams, C.M. 2006, 2nd edition, Jones and Bartlett learning **Recommended References:** An Introduction to Infectious Disease Modeling, Vynnycky, E. and White R. 2010, First Edition, Oxford University Press	**3**
50305834	**Advanced Clinical Virology** This course covers the basic concepts of virology and concentrated on the medical and molecular aspects of virology as well as diagnosis, therapy and vaccination against various viral infections. Also, this course will explore the current issues in medical virology. Furthermore, the emphasis is on modes of thinking necessary for understanding the significance of viruses to biology, the origin of life, and our current world. **Prerequisite:** None **Text Book:** J. Flint, V. R. Racaniello, G. F. Rall and A. M. Skalka. 2015. **Principles of Virology**. 4th Ed., Washington, DC: ASM Press, USA. **Recommended References:** **1-** N. J. Dimmock, A. J. Easton and K. N. Leppard. 2016. **Introduction to Modern Virology**.7th Ed., Wiley-Blackwell, USA. **2-** C. Zimmer. 2015. **A Planet of Viruses**. 2nd Ed., Chicago: The University of Chicago Press, USA. **3-** A. J. Cann. 2015. **Principles of Molecular Virology**. 6th Ed., Elsevier Science Publishing Co. Inc.	**3**

	4- Carter J. and V. Saunders. 2013. **Virology – Principles and Applications**. 2nd Ed., John Wiley.	
50305835	**Advanced Clinical Parasitology** This course covers advanced studies of parasitism and parasites such as worms, hexagonal and other arthropods serving as vectors for parasitic human diseases, life cycles of parasites of medical importance, modes of transmission, pathological effects on global human health and Laboratory diagnosis. **Prerequisite:** None **Text Book:** Parasitology for Medical and Clinical Laboratory Professionals. By John W. Ridley (2012). **Recommended References:** Medical Parasitology Laboratory Manual by Abdul Jabbar N. Al-Shammari (2017)	**3**
50305841	**Advanced Clinical Hematology** This course focuses on the study of blood components, including the study of erythrocytes and their defects and the study of WBCs and their forms and platelets. Study the formation, derivation of blood cells, their maturation stages, physiology and function of blood cell elements and plasma, normal cell forms and their numbers. Classification of anemia and malignant and non-malignant blood diseases include RBCs, WBCs and platelets is covered. In addition to provide the student with the practical knowledge and skill required by various laboratory techniques, counting blood cells and diagnosis of various blood diseases. **Prerequisite:** None **Text Book:** **1-** Postgraduate Haematology, Hoffbrand, A.V, Higgs, D.R., Keeling, D.M. and Mehat, A.B. 2016 7th edition. Wiley Blackwell. **2-** Atlas of Clinical Hematology, Loffler, H. Rastetter, J. Haferlach, T. 2014, (Sixth edition), Springer. **Recommended References:** 1- Hematology clinical principles and application, Rodak, B.F, Fritsma, G.A and Keohane, E.M Saunders, 2012 (Fourth edition), Elsevier Publisher 2- Hoffbrand's Essential Haematology, Hoffbrand, A.V. and Moss, P. A.H. 2016 (Seventh edition), Wiley Blackwell and Sons Ltd 3- Dacie and Lewis practical Haematology, Bain, B.J., Bates, I. and Laffan,M. 2017 (12 Ed.), Elsevier Publisher 4- Clinical hematology (Theory and procedure ,) Marry louise Turgeon, 2012, 5th edition, Lippincott Williams & Wilkins. 5- Clinical Hematology Atlas, Rodak, B.F. and Carr, J.H. 2017 (fifth edition), Elsevier publisher	**3**
50305843	**Blood Banking and Blood Transfusion** This course focuses in depth on the methods of blood transfusion, blood banking and different kinds of tests applied to patients in order to get ideal transfusion, blood grouping and transfections. Blood borne diseases will be covered. **Prerequisite:** None	**3**

	Text Book: Blood Banking and Transfusion Medicine, Hillyer, C. Silberstein, L. Ness, P. Anderson, K. and Roback, j. 2006. 2nd edition. Churchill Livingstone. **Recommended References:** 1- Modern Blood Banking and Transfusion practices 6th ed., Harmening, D.S., 2012 2- Herny's Clinical diagnosis and management by laboratory methods, Richard, A. *et al.*,, 22th ed., 2014	
50305851	**Diagnostic Molecular Biology** This course will discuss the theoretical and practical outline for the understanding and application of molecular biology techniques in the clinical laboratory and it will discuss the molecular organization, properties, and physiological functions of genetic material. Furthermore, a complete description of general methods for genetic manipulation including restriction analysis, cloning vectors, library construction, southern bolts, and polymerase chain reaction. Applications to biotechnology include over expression, transgenic organisms and DNA diagnostics **Prerequisite:** None **Text Book: 1.** Molecular Diagnostics: Fundamentals, methods and clinical applications by Lela Buckingham **2.**Molecular Diagnostics of Genetic disease (Methods in Molecular Medicine), Rob Elles **Recommended References:** **1.** Human Genetics: concepts and applications 9th by Ricki Lewis, McGraw-Hill Inc. **2.** Analysis of Genes and genomes 3th edition by Richard J. Reece **3.** Diagnostic Techniques in Genetics, by Jean-Louis Serre, John Wiley and Sons, Ltd	**3**
50305853	**Human Cytogenetics** Studying the cell division and chromosome structure and replication. Study of chromosome staining, karyotyping and FISH technique. Numerical and structural abnormalities of autosomes and sex chromosomes will be covered. This course will discuss cancer cytogenetic in detail. **Prerequisite:** None **Text Book:** The Principle of Clinical Cytogenetics, Gersen, S.L. and Keagle, M.B. 3rd edition, 2013, Springer **Recommended References:** Medical Cytogenetics, Mark, on Fong L. 2000. First edition. Taylor and Francis Group	**3**
50305860	**Pathophysiology** This course is designed to introduce the student to pathophysiologic concepts related to altered biological processes affecting individuals across the lifespan. The goal of this course is to establish a knowledge base for various clinical problems encountered in Internal Medicine and will introduce the fundamental concepts of pathophysiology in the clinical setting. Topics presented in this course will include cardiology,	**3**

	pulmonology, hematology, nephrology, gastroenterology, rheumatology, neurology, oncology and endocrinology diseases and other infectious diseases. **Prerequisite:** None **Text Book:** Advanced Pathophysiology: Application to Clinical Practice, Groer, M. 2001. First edition. Lippincott Williams and Wilkins **Recommended References:**	
50305861	**Lab Management and Instruments** This course will cover the organization, purposes, and practices of analysis, interpretation of results, and management of the medical laboratory from quality control topics through informatics and finances. It emphasizes on pre-analytic, analytic, and post-analytic components of laboratory analysis as well as oversight functions. This course will discuss the principles of analysis, instrumentation, and automation in medical laboratory. **Prerequisite:** None **Text Book:** Laboratory quality management system. World Health Organization, WHO library cataloguing in publication (2011) **Recommended References**: Essentials of clinical Laboratory Management in Developing Regions. De Kieviet et. al,Eds 2008.	**3**
50305862	**Scientific Research Methodology** This course will elucidate the nature of scientific research and how to conduct research, according to the proposed hypothesis. Students will be familiar with the way the research objectives and how to test theories and models in statistical tutorial. Students will also learn how to write a scientific paper that begins with a clear definition of objectives. In addition to all this you will learn how to display the research findings clearly and properly. **Prerequisite:** None **Text Book:** Research Methodology: A Step-by-Step Guide for Beginners 4th Edition, Ranjit Kumar 2014.SAGE publisher. London, UK. **Recommended References:**	**3**
50305863	**Animal Tissue Culture** The students will study in this course different animal cell culture techniques and acquire the necessary practical skills for the isolation of animal's cells for *in vitro* studies, maintenance of animal cells *in vitro*, manipulation of animal cells *in vitro*, and application of molecular techniques to *in vitro* situations. **Prerequisite:** None **Text Book:** Culture of animal cells: A Manual of Basic Technique and Special Applications, Freshney, R.I. 2016, 7th edition, Wiley Blackwell. **Recommended References:** Animal Cell Culture, Essential Methods, Davis, J.M. 2011. Wiley Blackwell	**3**
50305864	**Bioinformatics** In this course, students will be able to apply information technology and computational techniques to process genomic and genetic data, as well as developing novel drug discovery and	**3**

	diagnostic tools. In addition, they will gain the skills to design and implement software tools and databases using the latest advances in standalone and web-based technologies to fulfill the need of the research community. **Prerequisite:** None **Text Book:** Bioinformatics Principles and Applications, Chosh, Z. and Mallick, B. 2015, First edition**,** Oxford University Press. **Recommended References:** Applied Bioinformatics. An Introduction, Selzer, P.M, Marhofer, R.J. and Koch, O. 2014. Springer	
50305865	**Special Topics in Medical Analysis** This course covers topics related to Medical Laboratory Sciences topics, which are not covered in other courses. **Prerequisite:** The students should have completed 9 hours **Text Book:** **Recommended References:**	**3**
50305867	**Graduation Project** **Prerequisite:** The students must complete 21 hours In this course, the students will choose a research subject related to Medical Sciences after completing 24 credit hours. Then, they present a seminar on the chosen subject to be agreed upon with supervisor and finally discuss the research results of the subject. **Text Book:** According to the project subject **Recommended References:** According to the project subject	**3**
50305896	**Comprehensive exam** **Prerequisite:** Pass the credit hours required in the plan After completing 33 credit hours, the student will take the comprehensive exam and be in the basic knowledge fields, in the medical laboratory sciences discipline, that specified by the department.	**0**