

Al-Balqa Applied University

Curriculum for the Master Degree in

Medical Analysis / Thesis Track

The curriculum for the master degree in (Medical Analysis) consists of (33) credit hours distributed as follows:

Track	Requirements	Credit Hours (Cr. H.)
Thesis	A. Compulsory Courses	18
	B. Elective Courses	6
	C. Thesis	9
	Total	33

STUDY PLAN

MASTER DEGREE IN (Medical Analysis)

(Thesis Track)

I. GENERAL RULES AND CONDITIONS:

- 1- This plan conforms to the regulations of the general frame for graduate studies programs.
- 2- Areas of specialty of admission in this program:
 - (a) Bachelor of Medical Laboratory or Medical Laboratory Sciences
 - (b) Bachelor of Biology
 - (c) Bachelor of Biotechnology

II. SPECIAL CONDITIONS: M.D, M.B.B.S

Course Number	Course Title	Credit Hours
30205351	Hematology	3
30305455	Immunology and serology	3
30305341	Medical Microbiology	3

III. THE PLAN:

A. Compulsory Courses: (18 credit hours) as follows:

Course Number	Course Title	Credit Hours	Prerequisite
MLA812	Scientific Research Methodology	3	None
MLA821	Advanced Clinical Chemistry	3	None
MLA831	Advanced Clinical Microbiology	3	None
MLA832	Advanced Clinical Immunology and Serology	3	None
MLA841	Advanced Clinical Hematology	3	None
MLA851	Diagnostic Molecular Biology	3	None

B. Elective Courses: (6 credit hours) selected from the following:

Course Number	Course Title	Credit Hours	Prerequisite
MLA811	Lab Management and Instruments	3	None
MLA813	Animal Tissue Culture	3	None
MLA814	Bioinformatics	3	None
MLA815	Special Topics in Medical Analysis	3	The student should have completed 9 credit hours
MLA816	Pathophysiology	3	None
MLA822	Clinical Enzymology	3	None
MLA823	Clinical Endocrinology	3	None
MLA824	Forensic Medical Analysis	3	None

MLA833	Infectious Diseases and Epidemiology	3	None
MLA834	Advanced Clinical virology	3	None
MLA835	Advanced Clinical Parasitology	3	None
MLA843	Blood Banking and Blood Transfusion	3	None
MLA853	Human Cytogenetics	3	None

C. Thesis Track (9 credit hours) as follows:

Course Number	Course Title	Credit Hours	Prerequisite
MLA897	Thesis	9	Pass the credit hours required in the plan

COURSES DESCRIPTION

(Thesis Track)

Course No.	Course Description	Credit Hours
MLA811	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
MLA812	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 of 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 the student 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

MLA813	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 <i>in vitro</i> studies, maintenance of animal cells <i>in vitro</i>, manipulation of animal cells <i>in vitro</i>, and application of molecular techniques to <i>in vitro</i> situations. Prerequisite: None Textbook: 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
MLA814	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 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 Textbook: 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	3
MLA815	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 Textbook: Recommended References:	3
MLA816	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, 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:	3

MLA821	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 subjects in the clinical chemistry 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
MLA822	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
MLA823	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, 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	3

MLA824	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 <i>in vivo</i> and <i>in vitro</i> 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 Textbook: 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
MLA831	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. Textbook of Medical Laboratory Technology. 1st edition, 2006. Jaypee Brothers Ltd., New Delhi.	3
MLA832	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 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	3

	techniques. Prerequisite: None Textbook: <i>Kuby Immunology</i>. J. Owen, J. Punt, and S. Stranford. 2017. (7th Edition). W. H. Freeman Publishing, USA. Recommended References: <i>1-Immunology</i>. D. Male, J. Brostoff, D. Roth, and I. Roitt. Elsevier, UK, 2012 (8th edition). <i>2-Cellular and Molecular Immunology</i>. A. K. Abbas, A. H. Lichtman, and S. Pillai. Saunders, USA, 2017 (9th edition).	
MLA833	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 Textbook: <i>Infectious Disease Epidemiology Theory and Practice</i>, Nelson, K. F. and Williams, C.M. 2006, 2nd edition, Jones and Bartlett learning Recommended References: <i>An Introduction to Infectious Disease Modeling</i>, Vynnycky, E. and White R. 2010, First Edition, Oxford University Press	3
MLA834	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 Textbook: J. Flint, V. R. Racaniello, G. F. Rall and A. M. Skalka. 2015. <i>Principles of Virology</i>. 4th Ed., Washington, DC: ASM Press, USA. Recommended References: 1- N. J. Dimmock, A. J. Easton and K. N. Leppard. 2016. <i>Introduction to Modern Virology</i>. 7th Ed., Wiley-Blackwell, USA. 2- C. Zimmer. 2015. <i>A Planet of Viruses</i>. 2nd Ed., Chicago: The University of Chicago Press, USA. 3- A. J. Cann. 2015. <i>Principles of Molecular Virology</i>. 6th Ed., Elsevier Science Publishing Co. Inc. 4- Carter J. and V. Saunders. 2013. <i>Virology – Principles and Applications</i>. 2nd Ed., John Wiley.	3
MLA835	Advanced Clinical Parasitology	3

	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 Textbook: 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)	
MLA841	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 Textbook: 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
MLA843	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 transfusions. Blood borne diseases will be covered. Prerequisite: None Textbook: Blood Banking and Transfusion Medicine, Hillyer, C. Silberstein, L. Ness, P. Anderson, K. and Roback, j. 2006. 2nd edition. Churchill Livingstone. Recommended References:	3

	1- Modern Blood Banking and Transfusion practices 6 th ed., Harmening, D.S., 2012 2- Herny's Clinical diagnosis and management by laboratory methods, Richard, A. <i>et al.</i> , 22 th ed., 2014	
MLA851	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 Textbook: 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
MLA853	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 Textbook: 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
MLA897	Thesis The master thesis must be under the supervision of a faculty member and the work must represent an original contribution to Medical Sciences. The candidate must submit the finished thesis to the committee and successfully defend it in accordance with the graduate regulations. Prerequisite: Pass the credit hours required in the plan	9