

Study plan for Medical Laboratories Dept.

Level (1)

Level (2)

Course Symbol	Course	Credit Hours	Prerequisite	Course Symbol	Course	Credit Hours	Prerequisite
IC- 101	Islamic Study I	2(2+0)		IC- 102	Islamic Study II	2(2+0)	
ARAB -101	Arabic Language	2(2+0)		AMS- 121	Principles of Anatomy	3(2+1)	BIOL- 107
BIOL- 107	Human Biology	4(3+1)	Preparatory Year	AMS- 122	Principles of Physiology	3(2+1)	BIOL- 107
CHEM-104	General Chemistry	3(2+1)	Preparatory Year	CHEM- 109	Organic Chemistry	3(2+1)	CHEM-104
AMS- 110	Introduction to applied medical Science	2(2+0)	Preparatory Year	CHEM- 120	Analytical Chemistry	3(2+1)	CHEM-104
AMS- 111	Medical Terminology	2(2+0)	Preparatory Year	MDL- 120	General Microbiology	4(3+1)	BIOL- 107
AMS- 112	Health Care System and Vocational Safety	3(2+1)	Preparatory Year				
		18				18	

Level (3)

Level (4)

Course Symbol	Course	Credit Hours	Prerequisite	Course Symbol	Course	Credit Hours	Prerequisite
IC- 103	Islamic Study III	2(2+0)		IC- 104	Islamic Study IV	2(2+0)	
ARAB- 103	Expository Writing	2(2+0)		MDL- 221	Introduction to Immunology	4(3+1)	MDL- 120
MDL- 211	Histology	3(2+1)	AMS- 121	MDL- 222	Histotechnology	3(1+2)	MDL- 211
MDL-212	General Pathology	3(2+1)	AMS- 122	MDL- 223	Pathophysiology	3(2+1)	MDL- 212
AMS- 210	Ambulance Care	2(1+1)	AMS- 121	MDL- 224	Medical Biochemistry	3(2+1)	MDL- 214
MDL- 213	Medical Microbiology	3(2+1)	MDL- 120	MDL- 225	Biostatistics	3(2+1)	AMS- 112
MDL- 214	Principles of biochemistry	3(2+1)	CHEM-109				
		18				18	

Level (5)

Level (6)

Course Symbol	Course	Credit Hours	Prerequisite	Course Symbol	Course	Credit Hours	Prerequisite
MDL-311	Hematology	3(2+1)	MDL-211	MDL-321	Pharmacology and Antimicrobial	3(2+1)	MDL-213/214
MDL-312	Histopathology	3(2+1)	MDL-212	MDL322	Medical Genetics	3(2+1)	MDL-213/214
MDL-313	Clinical Biochemistry	3(2+1)	MDL-224	MDL323	Body Fluids Analysis	3(2+1)	MDL- 313
MDL-314	Electron Microscopy	3(1+2)	MDL-222	MDL324	Blood Banking	3(2+1)	MDL-221/311
MDL-315	Clinical Parasitology	3(2+1)	MDL-213	MDL325	Clinical Virology	3(2+1)	MDL- 213
MDL-316	Clinical Bacteriology	3(2+1)	MDL-213	MDL326	Clinical Mycology	3(2+1)	MDL- 213
		18				18	

Level (7)

Level (8)

Course Symbol	Course	Credit Hours	Prerequisite	Course Symbol	Course	Credit Hours	Prerequisite
MDL-411	Laboratory Management	2(2+0)	AMS-112 MDL-225	MDL-421	Diagnostic Molecular Biology	3(2+1)	MDL-413
MDL-412	Epidemiology	3(2+1)	MDL-221/225	MDL-422	Applied Immunology and Hematology	3(1+2)	MDL-414
MDL-413	Cellular and Molecular pathology	3(2+1)	MDL-223/322	MDL-423	Applied Clinical Microbiology	3(1+2)	MDL-315/316/ 325/326
MDL-414	Clinical Immunology and Serology	3(2+1)	MDL-221	MDL-424	Applied Clinical Biochemistry	3(1+2)	MDL-323
MDL-415	Analytical Laboratory Automation	4(3+1)	MDL-313/321	MDL-425	Case Study and Results Interpretation	2(2+0)	MDL-411
MDL-416	Research and Seminar I	1(0+1)	MDL-225	MDL-426	Research and Seminar II	2(1+1)	MDL-416
		16				16	

Course symbol: BIOL-107	Level: First
Course Title: Human Biology	Credit hours: 4(3+1)
Prerequisite: Preparatory Year	

Course Outline:

This course will introduce, at an entry level, the understanding of various cell structures and functions, eukaryotes vs. prokaryotes, classification of live organisms, introduction to the genetics and introduction to human biology including, introduction to human physiology, anatomy, and introduction to human embryology.

By the end of this course, student should be able to know:

- The cell as a functional unit, structure, and the main aspects of cell specialization, cytology and classification of live organisms.
- The transport mechanisms across the cell membrane
- The main principles of Physiology
- The cellular division and multiplication
- DNA and RNA, formation.
- DNA and the genetic code.
- Cellular processes needed for live
- Biochemical basis of generating energy
- Spermatogenesis – Oogenesis in human
- Fertilization and basic embryology
- Introduction to specialized anatomical structures
- Hormonal regulation of vital functions
- Neuronal regulation of vital functions

Teaching Organization:

- Theory lectures
- Laboratory sessions

Evaluation of students:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reference book designated:

Human Biology: Concepts and Current Issue
Biology, 8th Edition by Campbell, N.A. and J. B. Reece.

Course symbol: CHEM-104	Level: First
Course Title: General Chemistry	Credit hours: 3(2+1)
Prerequisite: Preparatory Year	

Course Outline:

General concepts, chemical calculations, molecular weight and chemical reactions in aqueous solutions, energy and its transformation, chemical bonds and chemical reactions and the cyclic table, thermal chemistry, properties of substances and attraction forces between molecules, physical properties of solutions, chemical equilibrium and neutralization of acids and alkalines in aqueous solutions, chemical mobility.

By the end of this course, student should be able to:

- Describe the atomic structure and define atomic number, mass number and isotopes
- Know chemical and physical bonding and their properties
- Know types of chemical reactions and concept of rate of reaction
- Know mole, molar mass, molarity and molality and their use in laboratory
- Know calculation formulae and their use in clinical laboratory
- Know oxidation-reduction reactions and their biological significance
- Know different types of solutions and solubility
- Define acids, bases and describe acid-base reactions
- Understand concept of pH and its calculations
- Know buffers and their types
- Know activation energy and endothermic and exothermic reactions
- Know 1st and 2nd law of thermodynamics and chemical equilibrium

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation of students:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reference book designated:

- General Chemistry, [John McMurry](#), [Robert Fay](#) International Edition Mar 2009, Paperback, 1056 pages .
- General Chemistry, John W. Hill, Ralph H. Petrucci, Terry W. McCreary, and Scott S. Perry., 4th edition, Pearson / Prentice Hall Publishing Company, New Jersey 2005.
- <http://www.chemistry.ohio-state.edu>

Course symbol: AMS-110	Level: First
Course Title: Introduction to Applied Medical Sciences	Credit hours: 2(2+0)
Prerequisite: Preparatory Year	

Course Outline:

This course gives the students brief informations about each department of applied medical sciences which involve the following:

Introduction to biomedical technology and medical equipments: In this part the student will acquire the technical and scientific ability to operate and maintain the relevant instruments and to work with the med-team to attain the proper planning and usage of these instruments.

Introduction to optometry: the student learns to distinguish the various optometric conditions of patients, early recognition of disease conditions and their development, as well as relevant prescriptions.

Introduction to medical laboratory: focuses upon training the student to be perform the analyses of biological samples and provide him with all the necessary information pertaining to achieve this objective.

Introduction to community health sciences: training the student to be highly qualified personnel equipped with the ability to educate the community to learn and apply healthy daily life styles.

Introduction to clinical nutrition; the student learn the various aspects of nutrition and the ways to maintain a healthy community by providing it with the means to adopt the proper nutritional life styles or needed nutritional treatments. In addition it enables him to deal effectively with nutritional problems arising in hospitals and other sections of the society.

Introduction to radiology: enable the student to acquire general and basic scientific knowledge and necessary techniques in the field of radiological science, and to acquaint him with the techniques of nuclear medicine and ultrasound and their applicability in diagnosis of various diseases.

Introduction to physical rehabilitation: gives the student the ability to utilize the various technologies used in physical therapy of incapacitated patient and all conditions requiring physical therapy intervention.

By the end of this course, student should be able to know:

- The various specialties in applied medical sciences
- The importance of each specialty and its role in the areas of health care
- The nature of each specialty which would enable him to chose the specialization most fitting to his abilities and inclinations.

Teaching Methods:

- Lectures
- Discussion

Evaluation Means:

- Semester Examination: 40%
- Final Examination: 60%

Reading List:

Internet source relevant material specific to each specialization as determined by the instructors.

Course symbol: AMS-111	Level: First
Course Title: Medical Terminology	Credit hours: 2(2+0)
Prerequisite: Preparatory Year	

Course Outline:

This course covers the linguistic structural basis for scientific and medical terminology in Latin and English and explanation of the main terms in different applications of medical science specialties to enable advanced students in different branches and graduates deal easily with physicians and other workers in different specialties. The course also aims at acquainting students with the pronunciation, writing and understanding of general principal medical terms and abbreviations corresponding to their Arabic homologues.

By the end of this course, student should be able to:

- Correctly pronounce medical terms
- Explain the meanings of the common medical terms regularly usable in medical and health area
- Correctly understand sentences that include these terms and abbreviations
- Fluent conversation in English with workers in the health field

Teaching Methods:

- Lectures
- Discussion

Evaluation Means:

- Semester Examination: 40%
- Final Examination: 60%

Reading List:

- Medical Terminology for Health Professions. Ann Ehrlich, Carol L Schroeder.
- Comprehensive Medical Terminology. Betty Davis Jones

Course symbol: AMS-112	Level: First
Course Title: Health Care System and Vocational Safety	Credit hours: 3(2+1)
Prerequisite: Preparatory Year	

Course Outline:

Introduction to applied health sciences, concept of health and factors affecting it, the general hierarchy of health services and their current and future needs, ethics of practice of the different health professions.

By the end of this course, student should be able to:

- Define health management
- Describe the organization of health management and its general hierarchy
- Define the health team and describe the principles of organization and control of the team.
- Explain the meaning of supervision and leadership
- Mention the principles of organization ethics
- Describe the levels of health care
- Define quality and describe how to achieve in health care services
- Mention the instruments and advantages of achieving quality of health care
- Know danger associated with health departments and affecting worker.
- Know safety procedures and problem solving in biohazard.

Teaching Methods:

- Lectures
- Discussion

Evaluation Means:

- Semester Examination: Written and practical 50%
- Final Examination: 50%

Reading List:

- Health Care Administration: Planning, Implementing, and Managing Organized Delivery Systems. Lawrence Wolper.
- Principles of Biomedical Ethics. Beauchamp and Childress.
- www.islamset.com (Islamic constitution of medical profession).

Course symbol: AMS-121	Level: Second
Course Title: Principles of Anatomy	Credit hours: 3(2+1)
Prerequisite: BIOL-107	

Course outline:

Introduction to anatomy of different regions and organs of human body
Systemic anatomy of: joints, lymph, digestive, urinary, reproductive, cardiovascular, respiratory, nervous (CNS and autonomic), musculoskeletal, endocrine, and embryology. Clinical anatomy of certain diseases in relation to systems organs

By the end of this course, student should be able to:

- Know the anatomical structure of the various systems of the human body.
- Know the relationship between some diseases and the anatomical structure.
- Know some facts about the human embryology.

Teaching Methods:

- Lectures
- Practical sessions.

Evaluation Means:

- Semester Examination: Written and practical 50%
- Final Examination: 50%

Reading list:

- Clinically oriented anatomy. Keith. L. Moore. 4th Ed. 1999
- Anatomy of the Human Body". Henry Gray. 20th edition. 1918". Publisher's page for Gray's Anatomy. 39th edition (UK). 2004. ISBN 0-443-07168-3"

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Course symbol: AMS-122	Level: Second
Course Title: Principles of Physiology	Credit hours: 3(2+1)
Prerequisite: BIOL-107	

Course Outline:

This course is aimed to understand the basis of various physiological functions of the body from the cell as the smallest functional component of the body to the function of various organs, systems. Further, these systems will be studied with objective to enhance the concept of integrative physiology, as functions of these systems, to the most part, they are interrelated.

By the end of this course, student should be able to know:

- The basic aspects of physiology and body functions
- The function of cell organelles, and cell specialization
- The functional division of the Nervous System (NS)
- The function of NS and the exerted control on key body organs
- The human endoskeleton, movement and locomotion.
- The chemical messengers and Endocrine system
- The cardiovascular system and Hepatic circulation.
- The neural control of blood volume and pressure
- The body fluid compartments and the blood as a tissue and clotting.
- The renal system and Homeostasis
- The respiratory system and gas exchanges
- The respiratory-renal adjustment of acid base
- The digestive system
- The Pancreatic-Hepatic functions
- The reproductive system
- The ovarian, Hormonal and menstrual cycles

Teaching Organization:

- Theory lectures
- Laboratory sessions

Evaluation of students:

- Semester Examination: Written and practical 50%
- Final Examination: 50%

Reference book designated:

Human Physiology: An Integrated Approach (5th Edition) by Dee Unglaub Silverthorn (2009).
Human Physiology: From Cells to Systems by Lauralee Sherwood (2009)
Principles of Human Physiology with Interactive Physiology (4th Edition) by Cindy L. Stanfield (2010)

Course symbol: CHEM- 109	Level: Second
Course Title: Organic Chemistry	Credit hours: 3(2+1)
Prerequisite: CHEM 104	

Course Outline:

The course covers general subjects in organic chemistry including aliphatic and aromatic hydrocarbons, their properties and reactions, alkyl, halides, alcohols, ethers, phenols, aldehydes, ketones, amines and carboxylic acids.

By the end of this course, student should be able to:

- Know hydrocarbons, their classification, nomenclature, physical and chemical properties and describe aliphatic and aromatic hydrocarbons.
- Know reactions of deletion, addition and substitution
- Know methane, ethylene, and acetylene and mention their properties
- Know alkyl halides, ether and alcohol and their classification and their physical and chemical properties
- Know aldehydes and ketones and their physical and chemical properties
- Define aromatic compounds, describe benzene structure and mention their physical and chemical properties
- Know carboxylic acids, their classification and their chemical and physical Properties

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Janice G Smith, organic chemistry , 2nd edition, McGraw Hill, New York, 2006
- Kenneth F. Cerny, Marietta H. Schwartz, Organic Chemistry, 978-0-757-54473-6, 216 pages, Kendall Hunt Pub Co, September 2008.
- Brown, W. H. and Poon, T. Introduction to Organic Chemistry, 3rd Edition. John Wiley, New York, 2005.

Course symbol: CHEM-120	Level: Second
Course Title: Analytical Chemistry	Credit hours: 3(2+1)
Prerequisite: CHEM 104	

Course Outline:

The course includes a survey of the classical methods of chemical analysis, the underlying theoretical concepts, and a brief introduction to modern instrumental analysis techniques.

By the end of this course, student should be able to:

- Describe the applied chemical principles used for separation, detection, identification, and quantification of samples constituents.
- Know statistical principles for chemical analysis
- Describe qualitative and quantitative analysis, i.e., gravimetric and volumetric analysis, concepts of acid-base, redox reactions, precipitation reactions, titrimetric analysis, spectrophotometric and chromatographic analysis as well as electrochemical behavior.
- Principles of quality control.

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Analytical Chemistry - An Introduction Douglas A. Skoog 7th Edition, 2000-
- Gary D. Christian, ed., Analytical Chemistry", 5th. Ed. John Wiley & Sons Inc., 1994
- H. Freiser, "Concepts and Calculations in Analytical Chemistry" A Spreadsheet Approach. Boca Ration: CRC Press, 1992.
- G.D. Christian and J.E. O'Reilly, "Instrumental Analysis", 2nd. Ed. Boston: Allyn and Bacon, 1986.
- Holler, F. James; Skoog, Douglas A.; West, Donald M. (1996). *Fundamentals of analytical chemistry*. Philadelphia: Saunders College Pub. ISBN 0-03-005938-0.
- Nieman, Timothy A.; Skoog, Douglas A.; Holler, F. James (1998). *Principles of instrumental analysis*. Pacific Grove, CA: Brooks/Cole. ISBN 0-03-002078-6.

Course symbol: MDL-120	Level: Second
Course Title: General Microbiology	Credit hours: 4(3+1)
Prerequisite: BIOL-107	

Course Outline:

This course covers the general principles of microbiology including classification of different groups of microbes, morphology of each group and study of their characters. Also the study includes a brief introduction to the infectious diseases regarding their types, causative microbial agents and methods of their control together with study of food and air microbiology.

By the end of this course, student should be able to:

General Bacteriology:

Introduction to bacteriology, morphological shape of microorganisms, structure of bacterial cell, reproduction and growth of bacteria, physiology of microorganisms, physical conditions required, or growth of bacteria, bacterial genetics, bacterial relationship, bacteriophage, bacterial metabolic products, system of bacterial identification, Infection, pathogenicity and virulence, chemotherapy and food bacteriology.

General Virology:

Introduction to virology, classification of viruses, structure of viruses, growth of viruses, viral genetics, Infection and pathogenicity of virus diseases.

General Mycology:

Introduction to mycology, classification of mycology, structure of fungi, reproduction of fungi, growth of fungi, Infections, pathogenicity and food mycology.

General Parasitology:

Introduction to parasitology, general definitions, Infections and pathogenicity of parasites. Epidemiology of parasites, diagnostics of parasites, control of parasites, classification of parasites: (Protozoa, Helminthes, and Arthropods).

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading Lists:

- Foundations in Microbiology. Kathleen P. Talaro, 2004.USA.
- Medical Microbiology: A short Course. Baron, et al., 1994. Willey-Lis.

Course symbol: MDL- 211	Level: Third
Course Title: Histology	Credit hours: : 3(2+1)
Prerequisite: AMS- 121	

Course Outline:

The aim of this course is to identify light microscopic structure of various normal human body organs and tissues in addition to the study of cell structure, and cell division.

By the end of this course, student should be able to know:

- Cell structure and division, chromosomes and genes.
- Epithelial tissue.
- Connective tissue, blood and lymphoid tissue.
- Muscular tissue
- Nervous tissue.
- Histology of digestive system.
- Histology of urinary and genital system.
- Histology of respiratory system.
- Histology of cardiovascular system.
- Histology of endocrine glands

Teaching methods:

- Lectures.
- Practical sessions.

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Theory and Practice of Histological Techniques. By ; John D Bancroft and Marilyn Gamble, 2002 (5th ed).
- Basic Histology: Text and Atlas, 10th Edition; 2002.
- Histology: A Text and Atlas, By Michael H Ross and Wojciech Pawlina 2005 (5th ed)

Course symbol: MDL- 212	Level: Third
Course Title: General pathology	Credit hours: 3(2+1)
Prerequisite: AMS-122	

Course Outline:

This course contains introduction to general and basic knowledge of diseases, their causes, pathogenesis, general morphological and changes at gross, microscopic and submicroscopic levels as well as the prognosis of the disease.

By the end of this course, student should be able to know:

- Definition of pathology and disease, causes of diseases, pathology specimens and methods of pathological studies and their relation to clinical aspects.
- Inflammation and repair.
- Cell injury, degeneration, tissue deposits, necrosis, gangrene.
- Circulatory disturbances.
- Infection and granuloma.
- Growth disorders and tumors.

Teaching methods:

- Lectures.
- Practical sessions.

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Pathologic Basis of Disease, 7th edition,2007, Elsevier. Robbins and Cotran
- Surgical Pathology, 9th edition, 2004. Rosai and Ackerman

Course symbol: AMS-210	Level: Third
Course Title: Ambulance Care	Credit hours: 2(1+1)
Prerequisite: AMS-121	

Course outline:

This course includes teaching the methods of dealing with critical clinical cases. The student should know how to diagnose these cases, give the first aid procedure and call the ambulance in the proper time.

By the end of this course, student should be able to:

- Know the critical clinical cases.
- Diagnose these cases.
- Give the first aid of these cases.
- Call the ambulance in the proper time.

Teaching Methods:

- Lectures
- Practical sessions

Evaluation Means:

- Semester Examination: Written and practical 50%
- Final Examination: 50%

Reading list:

- Internet source material specific to each critical clinical case as determined by the instructors. -
- Workshops given by ministry of health and Red Cresset

Course symbol: MDL- 213	Level: Third
Course Title: Medical Microbiology	Credit hours: 3(2+1)
Prerequisite: MDL -120	

Course Outline:

This course covers studying of different types of human diseases that caused by different types of microbes, like viruses, bacteria, fungi, and parasites. Also, student should be able to know the different methods of identification of these microbes, using both traditional and recent techniques, prevention and treatment.

By the end of this course, student should be able to:

Identify the different human diseases that caused by different microbes and how to identify them, prevent them and treat them:

Medical Bacteriology: Identify the different types of bacteria that cause human diseases and their classifications like corynebacterium diphtheriae, (diphtheria), mycobacterium tuberculosis (TB), mycobacterium leprae (leprosy), salmonella typhi (typhoid fever), proteus a common saprophyte of decaying organic matter and yersinia pestis (plague). In addition, student should know the procedure of diagnoses by direct microscopy, culture, ELISA and PCR.

Medical Virology: Identify the various groups of human viruses that comprise herpes, oncogenic, hepatitis, influenza, HIV and polio virus. Also, identify the clinical manifestations and describe these human diseases and role of transmission and mechanism of viral pathogenicity. In addition, student should be able to know different techniques in viral detection, as immunofluorescence technique, ELISA, indirect hemagglutination test, complement fixation test, PCR, and how to isolate viruses by using chicken embryo, tissue culture, or experimental animals.

Medical Mycology: Identify the various groups of medical mycoses that comprise superficial, cutaneous, subcutaneous and systemic mycosis. Also, identify the different manifestations by laboratory technique that include direct microscopy, culture, serology, and PCR with emphasis on mycosis.

Medical Parasitology: Identify the various groups of medical parasitosis and describe their clinical manifestations by means of laboratory diagnosis such as direct (microscopy) and indirect (serology) methods.

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Exam.: Written and Practical 50%
- Final Exam.: 50%

Reading List:

- Review of Medical Microbiology. Jawetz, Melnick and Adelberg, 2005.
- Practical Medical Microbiology. Mackie and McCortney, 1996.

Course symbol: MDL -214	Level: Third
Course Title: Principles of Biochemistry	Credit hours: 3(2+1)
Prerequisite: CHEM-109	

Course Outline:

This course offers detailed study of the chemical compositions and the biological functions of the main biochemical molecules including carbohydrates, proteins, lipids and their components, enzymes and different types of hormones. It also includes methods of practical qualitative and quantitative assays to discover these molecules.

By the end of this course, student should be able to:

- Know and classify the different groups of carbohydrates and their main biological significance with brief reference to some pathological conditions such as diabetes.
- Know and classify the main lipids and describe their chemical structures and biological significance with brief reference to some pathological conditions caused by lipid disorders such as atherosclerosis.
- Know amino acids, their classification, physical and chemical properties as well as describing their chemical structures, their main biological significance.
- Know proteins, their structures and physical and chemical forces affecting their structure with brief reference to some common proteins, e.g., haemoglobin, hormones e.g. insulin and immunoglobulin e.g. IgG
- Describe enzymes and their role in the biological reactions and as well as their diagnostic role in many diseases e.g. enzyme amylase in pancreatitis.
- Know the structure of nucleic acids i.e. DNA and RNA and their role in protein biosynthesis with brief reference to some of genetic disorders such as thalassaemia and cystic fibrosis.

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

Biochemistry.(1999): Matthews, C. E.; K. E. Van Holde; K. G. Ahern, 3rd edition. Benjamin Cummings. [ISBN 0-8053-3066-6](https://www.amazon.com/dp/0805330666)

Lehninger's Principles of Biochemistry (2005): Nelson DL, Cox MM., 4th Edition. W. H. Freeman and Company, New York.

Gutteridge A, Thornton JM. (2005). "Understanding nature's catalytic toolkit". Trends in Biochemical Sciences 30 (11): 622–29. [doi:10.1016/j.tibs.2005.09.006](https://doi.org/10.1016/j.tibs.2005.09.006). [PMID 16214343](https://pubmed.ncbi.nlm.nih.gov/16214343/)

[Biology: Exploring Life](#). (2006): Campbell, Neil A.; Brad Williamson; Robin J. Heyden . Boston, Massachusetts: Pearson Prentice Hall. [ISBN 0-13-250882-6](https://www.amazon.com/dp/0132508826).

Evolution of carbohydrate metabolic pathways (1996): Romano A, Conway T . *Res Microbiol* 147 (6–7): 448–55. [doi:10.1016/0923-2508\(96\)83998-2](https://doi.org/10.1016/0923-2508(96)83998-2). PMID 9084754.

Course symbol: MDL -221	Level: Fourth
Course Title: Introduction to Immunology	Credit hours: 4(3+1)
Prerequisite: MDL -120	

Course Outline:

This course presents detailed description to the structure of the immune system and its tissues, cellular properties, functions and chemical elements especially cytokines. It also includes definition of innate and acquired immunity, different mechanisms of immune response and hypersensitivity and its types. The course also gives detailed explanation of immunity against microbial injuries and methods of prophylaxis, serological and immunological diagnosis of microbial infection, immunodeficiency diseases, vaccine and toxoid action and preparation for prevention and treatment. In addition a brief introduction will be given on tissue typing on organ transplantation with great emphasis on laboratory equipment related to immunological diagnosis as ELISA, immunoblotting techniques, and PCR.

By the end of this course, student should be able to know:

- Innate (non-specific) immunity
- Complement system, antigens.
- Structure and function of immunoglobulin
- Classes of immunoglobulin: isotypes and allotypes
- Genetics of idiotypes, antigen-antibody reactions and test for these reactions
- Antibody formation, cells involved in immune responses, major histocompatibility complex, response to antigen.
- Cell-mediated immunity, immunoregulation, immunization, tolerance and autoimmunity .
- Hypersensitivity states, tumor immunology.
- Immunodeficiency (congenital and acquired).

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Immunology, 5th Edition . Richard A. Goldsby, Thomas J. Kindt, Janis Kuby, and Barbara A. Osborne 2000.
- Basic and Clinical immunology. Stites, Terr, Trisiran (eds), 2004.

Course symbol: MDL -223	Level: Fourth
Course Title: : Pathophysiology	Credit hours: 3(2+1)
Prerequisite: MDL - 212	

Course Outline:

The aim of this course is to give a summarized idea about structural and physiological aspects of different diseases affecting body organs and tissues with correlation to pathological process in laboratory and clinical findings and also the basic lines of management. The study is practically aided by identifying tissue sections of normal tissues compared different common diseases.

By the end of this course, student should be able to:

- Understand, and apply basic facts and concerns about normal function of different systems and correlate between functional disorders and disease process.
- Correlate pathological changes and functional disorders to abnormal laboratory findings.
- Know histological structure and function as well as functional disorders and common diseases affecting different body organs and tissues.

Teaching methods:

- Lectures.
- Practical sessions.

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Textbook of physiology and pathophysiology, essentials and clinical problems,,2000.
- Pathophysiology review , classical clinical cases, 2002.
- ACC Atlas of Pathophysiology, by: Springhouse , 2007

Course symbol: MDL -224	Level: Fourth
Course Title: Medical Biochemistry	Credit hours: 3(2+1)
Prerequisite: MDL -214	

Course Outline:

This course presents introductory biochemistry relevant to human health and disease that forms part of the foundation of modern medical practice. The molecular correlation with disease is emphasized throughout the course.

By the end of the course, student should be able to:

- Develop a broad and thorough understanding at the molecular level of metabolic and regulatory events that control the function of normal cells, tissues and organs and understand how these processes are altered by disease
- Describe the steps by which cells break down biological molecules to extract energy for the performance of work.
- Describe major cellular biosynthetic pathways, steps involved in these pathways and the regulation of key enzymes.
- Explain the lipid transport disorders and their relation to health.
- Explain energy balance and its disorders.
- Major metabolic disorders related to atherosclerosis, stroke, and diabetes.
- Understand genetic mutations and disease cases.

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Medical Biochemistry at a Glance, 2nd Edition
blackwellpublishing.com/book.asp?ref=1405113227
- Marks' Basic Medical Biochemistry: A Clinical Approach, 2004.

Course symbol: MDL- 225	Level: Fourth
Course Title: Biostatistics	Credit hours: 3(2+1)
Prerequisite: AMS-112	

Course Outline:

This course presents detailed description of characters types, displaying and presenting data, measures of central tendency, measures of dispersion, principles of probability, random variables and probability distribution, bimodal distribution, natural distribution, confidence intervals for mean, median, ratios and various statistics tests.

By the end of this course, student should be able to:

- Identify the different methods of collecting data.
- Interpret different types of data summaries including tables and charts.
- Show the advantages and disadvantages of different types of data presentation.
- Identify measures of central tendency and measures of dispersion and interpreting them.
- Estimate means and their confidence intervals and interpret results
- Identify properties of natural distribution and explain the diverse repeated distribution of biomedical data.
- Apply the suitable test for a list of specific data such as student T test, F test, or chi-square test.
- Use of computer applications in biomedical data analysis.

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Introductory Biostatistics for the Health Sciences. Chernick M and Friis R
- Presenting medical statistics from proposal to publication. Janet Peacock, 2006.

Course symbol: MDL- 311	Level: Fifth
Course Title: Hematology	Credit hours: 3(2+1)
Prerequisite: MDL – 211	

Course Outline:

This course includes identification of blood cells, their normal counts, morphology and study important blood diseases including coagulation and bleeding disorders

By the end of this course, student should be able to:

- Describe normal hematopoiesis and morphology of blood cells and platelets.
- Define and classify anemia types, bleeding and clotting.
- Define leucocytosis, leucopenia and enumerate their possible causes.
- Define and classify leukemia and describe features of blast cells in blood film and bone marrow.
- Make blood film to diagnose deferent types of anemia and leukemia

Teaching methods:

- Lectures.
- Practical sessions.

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Blood Principles and Practice of Hematology, 2nd ed. By Robert I Handin 2007.
- Anderson's Atlas of Hematology , Shauna C Anderson 2003.
- Atlas of Clinical Hematology, 6th ed. By Helmut Löffler, Johann Rastetter and Torsten Haferlach, 2005.

Course symbol: MDL- 312	Level: Fifth
Course Title: Histopathology	Credit hours: 3(2+1)
Prerequisite: MDL- 212	

Course Outline:

This course aims to give detailed informations about different diseases affecting body organs and tissues with correlation to pathological process and microscopic findings. The study is practically aided by tissue sections of different affected lesions of the body.

By the end of this course, student should be able to:

- Define biopsy in clinical and laboratory practice, tissue processing and staining.
- Understand the pathologic changes at gross and microscopic levels of various common diseases affecting different systems and tissues and correlate between functional disorders and disease process.
- Describe microscopic picture of different common lesions that affecting body organs and tissues
- Know the immunological staining and molecular tests in diagnostic laboratory.

Teaching methods:

- Lectures.
- Practical sessions

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Pathologic basis of disease, 7th ed. By Robbins and Cotran
- Surgical pathology, 9th ed. by Rosai and Ackerman.
- Curan atlas of pathology
- Sternberg's diagnostic surgical pathology, 4th ed. By Stacey E Mills 2004..

Course symbol: MDL- 313	Level: Fifth
Course Title: Clinical Biochemistry	Credit hours: 3(2+1)
Prerequisite: MDL -224	

Course outline:

This course discusses the role of biochemistry in clinical diagnosis, perform biochemical analyses using a variety of instruments; assess quality control data to permit result release; explain the pathogenesis of major organ diseases and assist in the interpretation of results in routine clinical biochemical testing.

By the end of this course, student should be able to:

- Understand the principles of clinical biochemistry related to health and disease.
- Perform routine clinical testing and describe the levels of various analyses, i.e., blood glucose, blood lipids, blood electrolytes, liver function tests, kidney function tests, hemoglobin measurement, separate blood proteins and hemoglobin types by electrophoresis.
- Perform special laboratory tests such as cardiac enzymes
- Identify plasma and urine drug concentration in toxicological cases and their measurements.
- Investigate common laboratory equipments used in urine and blood samples.
- Quality control procedure governing biochemical equipments.

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Clinical biochemistry, 3ed ed. Gaw A, Cowan R, O'Reilly D, Stewart M. 2004.
- Clinical biochemistry: techniques and instrumentation A practical course by John S Varcoe 2001.

Course symbol: MDL- 314	Level: Fifth
Course Title: Electron Microscopy	Credit hours: 3(1+2)
Prerequisite: MDL- 222	

Course outline:

This course aims to study techniques of histological preparations of samples and tissue sections to be examined by transmission and scanning electron microscopes. These techniques including different processes and materials used in fixation, washing, dehydration, embedding and sectioning by ultra-microtome then staining of ultra-thin sections and afterwards examining by electron microscope.

By the end of this course, student should be able to:

- Know the various techniques of samples and tissue 'sections preparations.
- Know the various materials and instruments used in preparation of different samples to be examined by electron microscopes.
- Know the different types of electron microscopes.
- Read the results from certain slides and solve trouble shooting.

Teaching Methods:

- Lectures
- Practical Sessions

Evaluation Means:

- Semester Examination: 50%
- Final Examination 50%

Reading list:

- Practical electron microscopy. Hunter, Elaine E. (1984).
- Basic electron microscopy. By Sameh El-Shewemi. 1997

Course symbol: MDL- 315	Level: Fifth
Course Title: Clinical Parasitology	Credit hours: 3(2+1)
Prerequisite: MDL- 213	

Course Outline:

This course offers the basics of medical parasitology where it includes classification of endo- and exoparasite including study of life cycles and ways of pathogenicity together with brief clinical description and determining suitable clinical specimens for laboratory diagnosis using the light microscopy and other laboratory tests such as immunoserological methods e.g. ELISA and PCR .

By the end of this course, student should be able to:

Know general definitions of parasitism, parasitosis of the digestive system, blood and lymph systems, respiratory system, excretory and reproduction system, nervous system, eye, skin, nose, ear and neck, muscles and connective tissues.

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Medical Parasitology: A Self-Instructional Text by Ruth, Ph.D. Leventhal and Russell F. Cheadle, 2002.

Course symbol: MDL- 316	Level: Fifth
Course Title: Clinical Bacteriology	Credit hours: 3(2+1)
Prerequisite: MDL -213	

Course Outline:

This course covers studying of different types of bacteria that cause diseases in human and their phenotypic characteristics and their structures in relation to bacterial pathogenicity, as well as, the diagnosis, prevention and treatment of these bacteria.

By the end of this course, student should be able to:

Identify different types of bacteria that cause human diseases and their classifications like corynebacterium diphtheriae (diphtheria), mycobacterium tuberculosis (TB), mycobacterium leprae (leprosy), salmonella typhi (typhoid fever), proteus a common saprophyte of decaying organic matter and yersinia pestis (bubonic plague). In addition, student should be able to know the virulence determinants of bacteria and the mechanism of bacterial pathogenesis and diagnosis (direct microscopy, culture, PCR) and treatment of pathogenic bacteria by conducting sensitivity test.

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Medical Microbiology. Greenwood et al. 2002
- Practical Medical Microbiology. Mackie and McCortney, 1996.

Course symbol: MDL- 321	Level: Sixth
Course Title: Pharmacology and Antimicrobial	Credit hours: 3(2+1)
Prerequisite: MDL- 213/214	

Course Outline:

This course deals with history and principles of pharmacology, principles of absorption, distribution, and elimination of drugs, mechanisms of actions, dynamics, negative side effects, drug interactions and drug classes with emphasis on chemotherapeutics. It also discusses activity of antibiotics in relation to their structure, culture and sensitivity, antibiotics and producer organisms, and the individual antibiotics. In addition: a brief information will be given on antiviral, antifungal and anthelmintics (antiparasites).

By the end of this course, student should be able to know:

- General pharmacology:
- Pharmacokinetics (absorption, distribution, metabolism and excretion)
- Pharmacodynamics (mechanism of drug action)
- Chemotherapy of microbes
- Classification of antibacterial agents and resistance
- Adverse reactions of antibacterial agents and interaction.
- Prophylaxis of infection with antibiotics and abuse
- Activity of antibiotics in relation to their structure including quantitative determination, minimum bacteriostatic concentration (MIC) and Minimum bactericidal concentration (MBC)
- Culture and sensitivity (antibiotic approach) and producer organisms
- Individual antibiotics (in brief) beta-lactam antibiotics, aminoglycosides, sulphonamides, tetracyclines, chloramphenicol, macrolides, miscellaneous and chemotherapy of tuberculosis.
- Antifungal, antiviral and anthelmintics (antiparasites).

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading Lists:

- Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy by David E. Golan, Armen H. Tashjian, Ehrin Armstrong, and Joshua M. Galanter, 2004
- The Antimicrobial Drugs by Eric M. Scholar and William B. Pratt, 2000

Course symbol: MDL- 322	Level: Sixth
Course Title: Medical Genetics	Credit hours: 3(2+1)
Prerequisite: MDL- 213/214	

Course Outline:

This course aims at give a summarized idea about principles of medical genetics and its applications in health and disease through studying chromosomal map, genetic control of cell functions, mutations, and diseases resulting from chromosomal aberrations, Mendelian disorders and multifactorial disorders. Also it deals with modern techniques and laboratory tests to diagnosis genetic diseases, genetic engineering and genetic counseling.

By the end of this course, student should be able to:

- Define chromosome, chromosomal map, genes and chromosomal aberrations and mutation.
- Explain genetic control of cell function and protein synthesis.
- Classify genetic disorders into cytogenetic, Mendelian and multifactorial disorders.
- Recognize the basis of laboratory tests used in screening and diagnosis of genetic disorders and premarital evaluation (screening).
- Genetic engineering and gene therapy

Teaching methods:

- Lectures.
- Discussion and case studies.

Means of evaluation:

- Semester examination: 50%.
- Final examination: 50%.

Reading list:

- Principles of Medical Genetics, 2nd edition. By: Thomas D Gelehrter MD; Francis Collins MD, PhD; David Ginsburg MD, 2007.
- Medical Genetics, Ekram Abdel-Salam, Cairo, 2006.
- Medical Genetics at a glance, by Dorian Pritchard, Bruce R Korf, Blackwell Publishing.

Course symbol: MDL- 323	Level: Sixth
Course Title: Body Fluid Analysis	Credit hours: 3(2+1)
Prerequisite: MDL- 313	

Course Outline:

This course discusses water and electrolytes balance, physiological regulation of water and electrolytes balance, urinalysis and urine sediments, seminal fluid, cerebrospinal fluid, synovial fluid, exudates, transudates, Mucus and pus.

By the end of this course, student should be able to analyze:

- Urinalyses and Urine Sediment.
- Water and electrolytes.
- Cerebrospinal fluids (CSF).
- Seminal Fluid
- Synovial Fluid
- Exudates and Transudates.
- Kidney and gall bladder stones.
- Trace minerals concentrations in blood.
- Acid-base balance and its disorders.
- Mucus and pus

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Urinalysis and Body Fluids :Susan King King Strasinger, Marjorie Schaub Di Lorenzo. 2001
- Clinical Chemistry: Principles, Procedures, Correlation 5th edition (2004).

Course symbol: MDL- 324	Level: Sixth
Course Title: Blood Banking	Credit hours: 3(2+1)
Prerequisite: MDL- 221/311	

Course Outline:

During this course the student will study blood phlebotomy, transportation and preservation with emphasis on antigens and antibodies reactions. Also it is include performance of blood banking procedures including blood grouping and Rh typing, antibody screens, antibody identification, cross matching, elution, and extract blood products such as platelet and plasma.

By the end of this course, student should be able to :

- Examine blood donors and select the proper one by certain tests.
- Perform cross matching.
- Identify the common and rare blood groups.
- Understand the mechanisms of incompatibility reactions in the human body.
- Extract blood products e.g. platelets, cryoplasma
- Educate community in blood donation campaign

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Textbook of Blood Banking and Transfusion Medicine
Sally Rudmann, PhD, MT(ASCP)SBB, CLS, Professor and Director 2005.

Course symbol: MDL- 325	Level: Sixth
Course Title: Clinical Virology	Credit hours: 3(2+1)
Prerequisite: MDL- 213	

Course Outline:

This course covers studying of different types of human viruses, their structures in relation to viral pathogenicity, symptoms and diagnosis. In addition to incidence and management of these viral infections.

By the end of this course, student should be able to:

- Identify various groups of human viral diseases such as herpes and others.
- Identify clinical manifestations and describe viral diseases in term of transmission and mechanism of viral pathogenicity and symptoms.
- Know to diagnose viral infection by different techniques in viral detection such as immunofluorescence technique, ELISA, indirect hemagglutination test, complement fixation test and PCR.
- Isolate the viruses by using chicken embryo, tissue culture, or experimental animals.
- know the managements of viral infections.

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading Lists:

- Medical Virology(4th ed.). Fenner and White, 1996
- Principles and Practice of Clinical Virology, 5th ed. Zukerman et al

Course symbol: MDL -326	Level: Sixth
Course Title: Clinical Mycology	Credit hours: 3(2+1)
Prerequisite: MDL -213	

Course Outline:

This course includes; study of different fungi types that cause diseases in human, their structures, characters, in addition to, incidence, diagnosis and management of mycoses.

By the end of this course, student should be able to:

- Identify various groups of medical mycoses.
- Identify superficial, cutaneous, subcutaneous and systemic mycosis.
- Differentiate fungal infection from other disease by symptoms and clinical manifestation
- Perform laboratory diagnosis of these fungi that including classical materials (direct microscopy, culture, serology) and modern techniques.
- Know manegment of medical mycosis

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading Lists:

- Medical Mycology (3rd ed). Rippon, 1988.
- Medical Mycology and Human Mycoses.Everett S., 1996.

Course symbol: MDL- 411	Level: Seventh
Course Title: Laboratory Management	Credit hours: 2(2+0)
Prerequisite: AMS-112/MDL-225	

Course Outline:

This course give an introduction to laboratories and their types, management, departments, laboratory information system (LIS), sample collection, transportation and preservation, quality assurance. It also includes dealing with instruments ant its trouble shooting, methods of analysis, safety precaution, and recognition of laboratory dangers.

By the end of this course, student should be able to:

- Define laboratory management
- Describe general plan of administrative organization of diagnostic and reference laboratories
- Describe components of laboratory information system (LIS).
- Describe the methods of specimen collection, transportation, preservation and storage
- Write result reports properly
- Understand the importance and relevance of quality assurance.
- Describe the important procedures for selecting equipments, their operation and maintenance according to certain guidelines.
- Perform quality control test to the equipments and diagnostic consumables
- Describe safety procedures in different diagnostic and research laboratories

Teaching Methods:

- Lectures
- Discussion

Evaluation Means:

- Semester Examination: 40%
- Final Examination: 60%

Reading List:

- Clinical Laboratory Management: Lynne Shore Garcia, editor (2004)
- Handbook of Laboratory Health and Safety, 2nd Edition(1995)

Course symbol: MDL- 412	Level: Seventh
Course Title: Epidemiology	Credit hours: 3(2+1)
Prerequisite: MDL- 221/225	

Course Outline:

This course deals with epidemiology and sources of infections in the community in particular especially that related to medical facilities (nosocomiel). Also it includes measures of prophylaxis, disinfection and sterilization in addition to contagious disease

By the end of this course, student should be able to know:

- Biology of Infectious Diseases
- Epidemiology of bacterial, rickettsia, chlamydia, virus, fungi and parasitic diseases
- Plan to control contagious diseases by prevention, vaccination and education.
- Zoonotic diseases
- nosocomiel infections

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Infectious Disease Epidemiology: Theory and Practice by Kenrad E., M.D. Nelson and Carolyn F Masters, Ph.D. 2006

Course symbol: MDL- 413	Level: Seventh
Course Title: Cellular and Molecular pathology	Credit hours: 3(2+1)
Prerequisite: MDL- 223/ 322	

Course Outline:

This course is intended to study the molecular basis of diseases and tumors in relation to their morphological and laboratory expression. It also includes identification of abnormal and malignant cells in pathological fluids and body discharges as well as fine needle aspiration specimens and its diagnostic applications. The study is aided by practical cytological smears of common lesions.

By the end of this course, student should be able to:

- Describe cell cycle and cell division.
- Understand molecular basis of various pathologic changes such as, cell injury, inflammation, necrosis, edema, carcinogenesis, genetic disorders and mutation.
- Perform image analysis, immunohistochemistry, flow cytometry and insitu hybridization to diagnose immunological graft rejection in organ transplantation.
- Describe microscopic features of malignancy in cytological smears of common lesions such as normal and malignant epithelial cells in urine, dysplastic and malignant cells in pleural aspirate and peritoneal fluid, inflammatory and dysplastic cells in cervicovaginal smears.
- Understand fine needle aspiration (FNA) of breast fibroadenoma and infiltrating duct carcinoma
- Analyze genital cellular fluids male and female

Teaching methods:

- Lectures.
- Practical sessions.

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Diagnostic Molecular Pathology, By: Mark H Stoler MD, 2007
- Leonard: Molecular Pathology in Clinical Practice, (1st ed) By Debra G B Leonard 2006 .
- Cytology: Diagnostic principles and clinical correlates., 2nd edition, by Edmund S Cibas, 2007, .
- Fine needle aspiration cytology, 4th edition, by Svante R. Osell, Chirchil Livingstone 2005.

Course symbol: MDL- 414	Level: Seventh
Course Title: Clinical Immunology and Serology	Credit hours: 3(2+1)
Prerequisite: MDL- 221	

Course Outline:

In this course students are introduced to applied aspects of immunological processes clinically and serologically. Explanation of immunological basis of the clinical condition is presented and the common laboratory serological tests related to immunological phenomena are also studied to evaluate patient's immune system and vaccine titration.

By the end of this course, student should be able to:

- Discuss basic clinical immunology methods.
- Discuss the theory and principles of routine clinical immunology procedures.
- Perform and interpret routine procedures used in serological laboratory.
- Report clinical immunology results and vaccine evaluation.
- Demonstrate proficiency in the performance of routine serological tests for syphilis including RPR, VDRL (for screening) and other techniques such as TPHA, Widal, Latex, EIA, and immunoblotting techniques.
- Perform fluorescent procedures according to established laboratory guidelines.
- Utilize appropriate samples, controls and serological kits and correctly perform the following tests according to the manufacturer's instructions

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Clinical Immunology and Serology: A Laboratory Perspective, 2nd ed. By Stevens, EdD, MT(ASCP) 2003.
- Basic and Clinical immunology. Stites, Terr, Tristran , 2004.

Course symbol: MDL- 415	Level: Seventh
Course Title: Analytical Laboratory Automation	Credit hours: 4(3+1)
Prerequisite: MDL- 313/321	

Course Outline:

The aim of this course is to train students on the principles and practices of instrumental analysis, involving the use of modern automated instrumentation in biochemical and medical applications. It also explain general laboratory instrumentation and support units, spectrophotometric and fluorescent techniques, clinical analyzers, immunoassays, automated hematology techniques, atomic absorption, advanced automated separation techniques of chromatography (HPLC, GC, GC-MS, LC-MS), flow cytometry and modern electrophoreses techniques and their applications in clinical, nutritional, environmental, drugs and narcotic abuse.

By the end of this course, student should be able to:

- Establish self confidence in dealing with instrumentation.
- Describe theoretical concept behind the design of instruments.
- Describe major operational requirements for each category of instrumentation.
- Describe application and utilization for each instrument in applied medical sciences.
- Handle trouble shooting procedures and regular maintenance with quality control measure.
- Demonstrate procedure of operation of major advanced instruments to others.
- provide complete description of necessary equipments in medical laboratory.
- work in research centre and reference laboratory

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Clinical Biochemistry: Techniques and Instrumentation: John S Varcoe 2001
- Principles of Instrumental Analysis, 5th Edition, by Douglas A. Skoog, F. James Holler & Timothy A. Nieman. 1998.
- <http://www.anachem.umu.se/jumpstation.htm>
- <http://www.uvm.edu/~jgoldber/courses/chem221/links.html>

Course symbol: MDL- 416	Level: Seventh
Course Title: Research Seminar I	Credit hours: 1(0+1)
Prerequisite: MDL- 225	

Course Outline:

Training on project establishment and methodology of execution including literature reviewed and use scientific information resources.

By the end of this course, student should be able to:

- Learn the essential steps the usage of library and electronic search
- Know types of scientific papers, thesis and journals
- Learn the classification of collected information in priority order
- Design a complete and basic research proposal.

Teaching Methods:

The student carries out a thorough literature search using different scientific resources under the supervision of a faculty staff member

Evaluation Means:

Written report	50%
Presentation and verbal examination	50%

Reading List:

- As directed by the student's advisor.

Course symbol: MDL- 421	Level: Eighth
Course Title: Diagnostic Molecular Biology	Credit hours: 3(2+1)
Prerequisite: MDL- 413	

Course Outline:

This course describes principles of modern techniques used in bio-molecular diagnosis with emphasis on biomedical molecular biology, gene mapping (genome), nucleic acid alteration (mutation) and genetic finger printing.

By the end of this course, student should be able to:

- Know basic biochemical and molecular biology.
- Perform major molecular diagnostic techniques such as nucleic acid extractions and purifications, blotting techniques, electrophoresis for molecular detection and mutation analysis, PCR for molecular detection techniques, fluorescence *in Situ* hybridization, DNA sequencing technique for forensic science, DNA variation (polymorphisms), gene expression analysis and medical cytogenetics
- Apply of molecular diagnostic techniques in genetic diseases, human cancer, infectious diseases, cardiovascular diseases, identity based testing, genetic finger printing, genome and genetic engineering.
- Perform quality assurance in the molecular diagnostic laboratory

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Molecular Diagnostics For the Clinical Laboratorian, 2nd Ed. Coleman, William B and Tsongalis, Gregory J. Saunders 2005.
- Fundamentals of Molecular Diagnostics David E. Bruns et al. Saunders 2007.

Course symbol: MDL- 422	Level: Eighth
Course Title: Applied Immunology and Hematology	Credit hours: 3(1+2)
Prerequisite: MDL - 414	

Course Outline:

This course deals with clinical and laboratory applications for important immunological and hematological disorders aided by case studies and explanation of laboratory findings.

By the end of this course, student should be able to:

- Know Immune mechanisms and diseases classification.
- Understand immunological basis of organ transplantation and HLA typing.
- Enumerate laboratory findings in different immunological disorders.
- Classify anemia and describe microscopic picture and laboratory findings of hemostasis disorder
- Define leukocytosis, leukopenia in relation to the underlying disease such as leuckemia and lymphoma.

Teaching methods:

- Lectures.
- Practical sessions

Means of evaluation:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading list:

- Immunohematology Principles and Practice. 2nd ed. By Eva D Quinley MS, MT(ASCP).
- Blood Principles and Practice of Hematology, 2nd ed By Robert I Handin MD; Samuel E. Lux MD; Thomas P Stossel MD.
- Pathologic Basis of Disease, 7th edition By Robbins and Cotran.

Course symbol: MDL- 423	Level: Eighth
Course Title: Applied Clinical Microbiology	Credit hours: 3(1+2)
Prerequisite: MDL -315/316/325/326	

Course Outline:

This course covers studying of different microbes in term of isolation and identification of viruses, bacteria, yeasts, fungi and parasites that infect the different organs with interest in clinical practice of microbiology throw case studies.

By the end of this course, student should be able to:

Identify, diagnose and treat microbes infection of the gastrointestinal tracts, genito-urinary, central nervous systems, and diseases affecting eye, skin and musculoskeletal tissues

Teaching Methods:

- Lectures
- Seminars
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading Lists:

- Review of Medical Microbiology. Jawetz, Melnick and Adelberg, 2005.
- Practical Medical Microbiology. Mackie and McCortney,1996.

Course symbol: MDL- 424	Level: Eighth
Course Title: Applied Clinical Biochemistry	Credit hours: 3(1+2)
Prerequisite: MDL- 323	

Course Outline:

The aim of this course is to train students on different routine and special clinical biochemistry tests used in clinical laboratories and all technical and scientific procedures related to these tests.

By the end of this course, student should be able to:

- Know clinical biochemistry tests and their application and operation of equipments
- Prepare standard operating procedure (SOP) manuals
- Prepare and perform quality control procedures for all tests
- Know method settings and evaluations
- Know result interpretation, reporting and authorization
- Advise and train the medical and laboratory staff
- Contribute to research and development in the laboratory

Teaching Methods:

- Lectures
- Discussion
- Practical sessions

Evaluation Means:

- Semester Examination: Written and Practical 50%
- Final Examination: 50%

Reading List:

- Clinical Biochemistry: Techniques and Instrumentation: John S Varcoe 2001
- Tietz Textbook of Clinical Chemistry, 3rd Edition, Burtis , Ashwood and Tietz, 1999

Course symbol: MDL- 425	Level: Eighth
Course Title: Case Study and Results Interpretation	Credit hours: 2(2+0)
Prerequisite: MDL- 411	

Course Outline:

During this course students will study and prepare selected case studies for different disease conditions including physiological, pathological, clinical, and diagnostic aspects. Student will thoroughly study the case designated and carry out all investigation to draw final diagnosis. The work will be presented in the form of written report and seminar presentation.

By the end of this course, student should be able to:

- Study different disease conditions and perform required investigations and draw right diagnosis
- Prepare selected case study for disease condition using patient medical records and other scientific resources
- Interpret laboratory results and statistics of the case
- Prepare and write detailed report.
- Present case study in form of seminar and discuss it in depth with his colleagues and instructor

Teaching Methods:

Written report
Seminar presentation
Verbal and questions

Evaluation Means:

- Scientific Report 50%
- Presentation and Discussion 25%
- Verbal Exam 25%

Reading List:

- As directed by the student's advisor.

Course symbol: MDL -426	Level: Eighth
Course Title: Research Seminar II	Credit hours: 2(1+1)
Prerequisite: MDL -416	

Course Outline:

This course helps student to start predetermined project including data acquisition and analysis then write report under the supervision of a faculty staff member.

By the end of this course, student should be able to:

- Conduct practical research
- Collect data
- Analyze data
- Trouble shooting
- Write research progress reports
- Write a final "paper" format with presentation in form of seminar.

Teaching Methods:

The student conduct the practical research project under the supervision of a faculty staff member

Evaluation Means:

- Written Report 50%
- Viva Examination 50%

Reading List:

- As directed by the student's advisor.