

Course Description: Medical Microbiology (CLS 212)

Course number: CLS212	Course title: Medical Microbiology
Level/semester:	3rd level /2nd semester (Non-CLS Students)
Credit hours: 4 hrs	Thereof lecture hours: 3 hrs
	Thereof practical hours: 1hrs
Language:	English language
Aims and goals/ skills of the course:	This is a general medical microbiology course intended for students outside the department of Clinical Laboratory Sciences. The structure of the course is based on presenting the fundamentals of microbiology to include structures, morphology and classification of bacteria, viruses, fungi and parasites. The students will be introduced to the pathogenesis of the various infectious agents. The course will also cover some topics related to community health, including the modes and sources of infections as well as prevention of these infections.

CLS 212: Lectures Outline

Content of the course:

Weeks

Subjects

- | Weeks | Subjects |
|--------------|--|
| 1. | General introduction
Historical Background & classification of microorganisms |
| 2. | Introduction to Viruses
Structure and morphology of viruses
Classification / Replication / Pathogenicity |
| 3. | Introduction to Fungi
Structure and morphology of fungi
Classification / Fungal diseases |
| 4. | Introduction to Parasites
Classification /General characteristics of protozoa
Medically important protozoa
General characteristics of helminths/Medically important helminths |
| 5. | Introduction to Bacteria
Classification / Morphology
Bacterial Structures / Bacterial replication |
| 6. | Bacterial growth / Growth curve
Factors affecting growth |
| 7. | Antimicrobial agents |
| 8. | Microbial control / Principles
Physical and chemical methods |
| 9. | Microbial control – Chemical agents
Hospital acquired infections |
| 10. | Pathogenicity of infectious diseases
Normal microbial flora |
| 11. | Upper respiratory tract infections |
| 12. | Lower respiratory tract infections |
| 13. | Wound and skin infections |
| 14. | Sexually transmitted diseases |
| 15. | Food borne diseases, Water borne diseases |

Examination: Assessments:	<i>written & Practical examination</i>	
	1st Mid Term Examination: Written	15
	2nd Mid Term Examination: Written	15
	Mid Term Examination: Practical	10
	Final Practical Examination:	20
	Final Theoretical Examination:	40

	Total:	100

Course Description

Course number: CLS 221	Course title: Basic Anatomy & Physiology
Level/semester: e.g. 2 nd	Semester/ 3rd Level
Credit hours:	Thereof lecture hours: 4
	Thereof practical hours: 0
Language: English	
Aims and goals/ skills of the course:	To acquaint the student with a comprehensive knowledge about the anatomy and physiology of the human body that help him to build his background information in the basic sciences that will enable him to understand the deviation from the normal in the different specialities that he/she may be directed to later on.

Content of the course:

Weeks	Subjects
1.	Introduction to Anatomy and Physiology: <ul style="list-style-type: none">- Body orientation, planes and sections, surface anatomy, body cavities and terminology, organ systems: an overview- Body fluids and its distribution, mechanism of transport across the cell membrane, structure of the cell membrane
2.	Cell and Tissues: <ul style="list-style-type: none">- Structure and function of cell, Cell division- Body tissue: Epithelial tissue, Connective tissue, Muscle tissue, Nervous tissue
3.	Skin and Body Membrane: <ul style="list-style-type: none">- Basic structure and function of skin, Appendages- Classification of body membranes
4.	Skeletal system: <ul style="list-style-type: none">- Functions, bone markings and classification of bones, structures of bones, Applied aspects
5.	Nervous System: <ul style="list-style-type: none">- Division by the Nervous system, Nervous tissue – Neuroglia, neurons classification and their microscopic structure physiology – Nerve impulses- Central Nervous System: Brain- different parts, Meninges and spinal cord, CSF- Peripheral Nervous System: Cranial and spinal nerves, Important Nerves, Autonomic Nervous System- Introduction, Applied aspects
6-7.	Cardiovascular System: <ul style="list-style-type: none">- Heart structure, External features Chambers, valves, pulmonary and systemic circulation Major arteries and veins of the body, special circulation
8.	Physiology: Cardiac cycle and heart sounds <ul style="list-style-type: none">- Conduction system of the heart- Blood vessels, microscopic anatomy- Blood pressure, Pulse- Applied aspects
9.	Respiratory System: <ul style="list-style-type: none">- Nasal cavity, pharynx, larynx, trachea, primary bronchi, lungs, Physiology – Mechanics of respiratory gases and their transport, regulation of respiration- Applied aspects
10	Digestive System: <ul style="list-style-type: none">- Organs of alimentary canal, mouth, pharynx, oesophagus, stomach, small and large intestines- Accessory digestive organs, pancreas, liver and gall bladder, salivary glands and teeth, Physiology- functions of the digestive system, Applied aspects
11.	Urinary system: <ul style="list-style-type: none">- Kidneys- location and structure of nephrons and urine formation, control of blood composition- Characteristics of urethras, urinary bladder and urethra- Micturition
12.	Reproductive System: <ul style="list-style-type: none">- Male reproductive system- Testes- structure and functions, spermatogenesis and testosterone production, Duct system: Epididymis, Vas deferens, Accessory glands, External genitalia- Nerve and Muscle Physiology:<ul style="list-style-type: none">- Structure of the nerve, generation of action potential (nerve impulse), conduction of nerve impulse, types of nerves- Structure, types of muscles, mechanism of muscle conduction, types of muscle contraction and concept of muscle fatigue
13.	Blood Physiology: <ul style="list-style-type: none">- Composition of the blood- Function of the different blood cells and the plasma- The process of haematopoiesis

Examination:*e.g. written examination, presentation*

First Mid Term Examination: 30

Second Mid Term Examination: 30

Final Theoretical Examination: 40

Course Description

Course number: CLS 222	Course title: Descriptive Histology	
Level/semester:	4th level / 2nd Semester	
Credit hours:	Thereof lecture hours: 2	
	Thereof practical hours: 2	
Language: English		
Aims and goals/ skills of the course:	The overall objective of this course is to prepare the students for the advanced courses in CLS and enables the student to identify microscopically the normal tissues and organs of the human body.	
Content of the course:	Weeks	Subjects
	1.	Introduction
	2-3.	Epithelial tissue:(definition, features, classification & function)
	4.	Connective tissue (definition, features, cells and fibers)
		Connective tissue types: (loose, dense, reticular, adipose and elastic)
	5.	Supportive connective tissue, Cartilage (general features, functions and types: hyaline, elastic, white fibrocartilage), Bone (general features, functions, types: spongy, compact and development)
	6.	Muscular tissue (general features and types)
	7.	Nervous tissue, Central nervous system (parts), types and structure of neuron Peripheral nervous system: Types and structure of nerves and ganglia, Nerve endings, Synapse ,Neuroglia
	8.	Circulatory system, Blood circulation, Heart structure and function Arteries and veins (types, structure and comparison of both) Comparison between capillaries and sinisoids Lymph circulatory system: lymph vessels
	9.	Lymphatic organs, Lymph nodes: structure and function Spleen, thymus, tonsils
	10.	Respiratory system, Upper: nose, nasopharynx, larynx, Lower: trachea, bronchus, bronchiole , Structure of the lung, Pleura
	11-12.	Digestive system, Oral cavity: lip, tongue (papillae and its function) Digestive tube: general structure of esophagus, stomach, small and large intestine, appendix
	13.	Digestive glands: Salivary gland, liver, gall bladder and pancreas
	14.	Urinary system, Parts, function and structure of kidney and urinary passage (ureter, urinary bladder and urethra in males and females)
Examination:	<i>written & practical examination</i>	
	First Mid Term Examination: 15	
	Second Mid Term Examination: 15	
	Student activities, sharing, Quiz 10	
	Final Practical Examination: 20	
	Final Theoretical Examination: 40	

Course Description

Course number: CLS 223	Course title: General Pathology
Level/semester: 4	
Credit hours: 2 hours	Thereof lecture hours: 2 hour
	Thereof practical hours: 0 hour
Language: English	
Aims and goals/ skills of the course:	To recognize the causes of cellular stress and the general pathologic responses to cellular stress, the circulatory disturbances, the basic immune reactions, the main immunopathologic processes and disorders of growth and neoplasia.

	1. TOPICS to be COVERED/ WEEK	Contact hours		W
Content of the course:	Introduction, Define pathology, Define disease, study of disease Predisposing and determining factors, Pathological anatomy (lesion) Manifestation of the disease, Pathological physiology, Diagnosis	4		W
	Causes of cell damage (stress) Cellular response to stress Degeneration Necrosis and gangrene	2		W
	<u>Inflammation</u> (definition, nomenclature and causes) Pathogenesis, local vascular changes of acute inflammation The inflammation exudates, inflammatory cells and chemical mediators and sequelae of acute inflammation special types of acute inflammation types of chronic inflammation general effects of inflammation	4		W
	<u>Infection</u> factors influencing establishment of infection factors influencing the course of infection mechanism by which disease is produced: bacterial, viral and opportunistic infections <u>Healing</u> wound healing factors influencing wound healing complications healing in special situations e.g. kidney, liver muscle, nervous tissue and bone	2		W
	1st Mid Term Exam	1		W
	<u>Circulatory Disturbances</u> hyperemia congestion obstruction causes: thrombosis, embolism effect of vascular obstruction leading to oedema heamorrhage	4		W
	<u>Disturbances of growth</u> Hyperplasia, hypertrophy, atrophy, dysplasia and metaplasia <u>Neoplasia</u> definition and classifications general features of benign and malignant tumors effects and complication of benign and malignant tumors tumor of epithelial, connective, muscular and nervous tissues carcinogenesis brief discussion on diagnosis of tumors and treatment	4		W
	2 nd Mid Term Exam	1		W
	<u>Immunology</u> specific and non-specific immunity immune response, antigen, antibodies, compliment, humoral cell mediated response <u>Diseases of the immune system</u> hypersensitivity reactions auto-immune disease, tolerance immune deficiency diseases	4		W
	Assignment	2		W
	Final Theoretical examination		W	

Examination:

First and second midterm examinations (50%), Final theory examination (40%) and Assignments (10%)

Course Description

Course number: CLS 231	Course title: Clinical Analytical Chemistry		
Level/semester: 4th			
Credit hours: 3 hours	Thereof lecture hours: 2 hour		
	Thereof practical hours: 1 hour		
Language: English			
Aims and goals/ skills of the course:	This course involves a review of fundamental concepts of volumetric analysis as applied to biological fluids. The theoretical and practical aspects of different types of titri-metric analysis including acid-base, complex metric and precipitation titrations are studied.		
Content of the course:	Topics	Planned Contact Hours	Actual Contact Hours
	General Introduction/The analytical process (2 weeks)	4	4
	Review of Fundamental concepts (1 week)	2	2
	Acid Base theories and Ionisation of acids and bases (2 weeks)	2	2
	Acid Base titrations (1 week)	4	4
	Buffers and the pH scale (1 week)	2	2
	Complexo metric Reactions and Titrations (1 week)	2	2
	Precipitation Reactions and Titrations(1 week)	2	2
	Potentiometric Electrodes (1 week)	2	2
	Redox titrations (1 week)	2	2
	Gravimetric analysis of calculations (1 week)	2	2
	Introduction to instrumental analysis	4	4
Examination:	Midterm examination (15%), Reports (15%) and Final written examination (40%) and Lab sessions (15%) and Final lab examination (15%)		

Course Description

Course number: CLS 232	Course title: Clinical Biochemistry (I)																								
Level/semester	4 th level / 2 nd Semester																								
Credit hours:	Thereof lecture hours: 3																								
	Thereof practical hours: 1																								
Language:	English																								
Aims and goals/ skills of the course:	<p>This course illustrates structures and functions of biomolecules which includes carbohydrates, proteins, lipids, nucleic acids, enzymes and hormones.</p> <p>In the practical part of this course, students study the detection and quantitative determination of some of these biomolecules.</p>																								
Content of the course:	<table border="1"> <thead> <tr> <th>Weeks</th> <th>Subjects</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Acids, bases, pH scale, buffer system</td> </tr> <tr> <td>2.</td> <td>Chemical bonds</td> </tr> <tr> <td>3.</td> <td>Amino acids: structure, physical and chemical properties</td> </tr> <tr> <td>4.</td> <td>Peptide bonds, proteins: types, structure, functions</td> </tr> <tr> <td>5.</td> <td>Protein purification</td> </tr> <tr> <td>6.</td> <td>Nucleotides and nucleic acids</td> </tr> <tr> <td>7.</td> <td>Enzymes</td> </tr> <tr> <td>8,9.</td> <td>Carbohydrates</td> </tr> <tr> <td>10,11.</td> <td>Fatty acids and lipids</td> </tr> <tr> <td>12.</td> <td>Hormones</td> </tr> <tr> <td>13.</td> <td>Vitamins</td> </tr> </tbody> </table>	Weeks	Subjects	1.	Acids, bases, pH scale, buffer system	2.	Chemical bonds	3.	Amino acids: structure, physical and chemical properties	4.	Peptide bonds, proteins: types, structure, functions	5.	Protein purification	6.	Nucleotides and nucleic acids	7.	Enzymes	8,9.	Carbohydrates	10,11.	Fatty acids and lipids	12.	Hormones	13.	Vitamins
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Examination:	<p><i>Written & practical examination,</i></p> <p>First Mid Term Examination: 15 Second Mid Term Examination: 15 Quizzes: 5 Laboratory Reports: 5 Final Practical Examination: 20 Final Theoretical Examination: 40</p>																								

Course Description

Course number:	Course title: CLS 241: Haematology														
Level/semester:	level 4- second semester														
Credit hours:	Thereof lecture hours: 2														
	Thereof practical hours: 2														
Language: English															
Aims and goals/ skills of the course:	<p>a. To recognize the normal cellular, properties and functions of haemopoietic cells</p> <p>b. To understand the mechanisms of pathophysiology of different haemopoietic diseases</p> <p>c. to recognize different forms of red blood cell abnormalities, white blood cell abnormalities and platelet and clotting factors abnormalities</p> <p>d- understanding and on hand training of clinical laboratory techniques use for diagnosis of hematological disorders.</p>														
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Examination:	<ol style="list-style-type: none"> 1. Mid term theoretical exam: Multiple choice questions 2. Mid term practical exam 3. Written assignment 4. Final practical exam 5. Final theoretical exam 														

Course Description: Basic Microbiology (CLS 311)

Course number:CLS 311	Course title: Basic Microbiology
Level/semester:	5th level /2nd semester
Credit hours: 4 hrs	Thereof lecture hours: 3 hrs
	Thereof practical hours: 1hrs
Language:	English language
Aims and goals/ skills of the course:	This course provides the students with basic theoretical and practical aspects of various groups of microorganisms to include bacteriology, virology, mycology, and parasitology as well as basic concepts of immunology and epidemiology. It also introduces the basic concepts of disinfectants, antiseptics, preservatives, Ames test, methods of sterilization, aseptic techniques and general microbial control.

CLS 311: Lectures Outline

Weeks	Subjects
1.	General introduction to Microbiology Historical background and Classification of Microorganisms
2.	Introduction to Viruses: Classification, morphology and structure, Replication and Pathogenicity
3.	Introduction to Fungi: Classification, morphology and structure, Replication and Pathogenicity
4.	Introduction to Parasites: Classification, General Characteristics of parasites and Medically important Parasites
5.	Introduction to Bacteria: Classification, Morphology and Structures
6.	Bacterial Structures
7.	Microbial Growth requirements: Nutritional requirements, Physical requirements, Types of bacteria according to energy production
8.	Bacterial Growth: Growth curve, Constant and synchronous growth
9.	Bacterial Metabolism: Catabolic Pathways and regulation
10.	Bacterial Genetics: Mutation and mutagenic agents ,&Ames test Gene transfer ,PCR ,& genetic engineering
11.	Bacterial Genetics continued
12.	Microbial Control: Principles, Disinfectants, antiseptics, and preservatives Physical and chemical methods of sterilization Aseptic techniques
13.	Microbial control continued...
14.	Pathogenicity of Infectious Diseases
15.	Normal Microbial flora

Content of the course:

Examination: Assessments:	<i>written and practical examination</i>	
	1st Mid Term Examination: Written	15
	2nd Mid Term Examination: Written	15
	Mid Term Examination: Practical	10
	Final Practical Examination:	20
	Final Theoretical Examination:	40

Total:	100	

Course Description

Course number: CLS 312	Course title: Clinical Mycology
Level/semester	6th level / 2nd Semester
Credit hours:	Thereof lecture hours: 2
	Thereof practical hours: 1
Language:	English
Aims and goals/ skills of the course:	In this course the students will learn about the fungi (molds and yeasts) of medical importance and the diseases they cause. The classification, structure physiology, and cultural characteristics of fungi will be discussed. Emphasis in this course will be on the fungal diseases and their clinical presentation, pathogenesis, modes of transmission, laboratory diagnosis, prevention and control.

	Weeks	Subjects
Content of the course:	1.	Introduction to Mycology. Structure and morphology of fungi
	2.	Fungal classification and taxonomy
	3.	Superficial mycosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	4.	Dermatophytosis : Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	5.	Mycetoma: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	6.	Chromoblastomycosis, Phaeohyphomycosis, Sporotrichosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	7.	Zygomycosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	8.	Lobomycosis, Rhinosporidiosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	9.	Aspergillosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	10.	Candidiasis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	11.	Cryptococcosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	12.	Trichosporonosis, Geotrichosis Pneumocystosis: Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	13.	Primary Systemic Fungal Infection: Blastomycosis, Histoplasmosis - Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
	14.	Primary Systemic Fungal Infection Coccidioidomycosis, and paracoccidioidomycosis - Definition, symptoms, epidemiology, etiology, laboratory diagnosis and treatment
Examination:	<i>written, practical, presentation examination,</i> Mid Term Examination: 15 Continuous evaluation 5 Laboratory Notebook: 10 Final Practical Examination: 30 Final Theoretical Examination: 40	

Course Description

Course number: CLS 321	Course title: General Pathology
Level/semester	5th level / 2nd Semester
Credit hours:	Thereof lecture hours: 2
	Thereof practical hours: 1
Language:	English
Aims and goals/ skills of the course:	Upon completion of this course, the students will have the appropriate knowledge about the causes of cellular stress and the general pathologic responses to cellular stress, the circulatory disturbance, the basic immune reactions, the main immunopathologic processes, Disorders of growth and neoplasia.

	Weeks	Subjects
Content of the course:	1.	Introduction <ul style="list-style-type: none"> - Define pathology - Define disease, study of disease
	2.	Etiology <ul style="list-style-type: none"> - Predisposing and determining factors - Pathological anatomy (lesion) - Manifestation of the disease - Pathological physiology - Diagnosis
	3.	Causes of cell damage (stress) <ul style="list-style-type: none"> Cellular response to stress Degeneration Necrosis and gangrene
	4-5.	Inflammation (definition, nomenclature and causes) <ul style="list-style-type: none"> Pathogenesis, local vascular changes of acute inflammation The inflammation exudates, inflammatory cells and chemical mediators and sequelae of acute inflammation - special types of acute inflammation - types of chronic inflammation general effects of inflammation
	6.	Infection <ul style="list-style-type: none"> - factors influencing establishment of infection - factors influencing the course of infection - mechanism by which disease is produced: bacterial, viral and opportunistic infections
	7.	Healing <ul style="list-style-type: none"> - wound healing - factors influencing wound healing - complications - healing in special situations e.g. kidney, liver muscle, nervous tissue and bone
	8-9.	Circulatory Disturbances <ul style="list-style-type: none"> - hyperemia - congestion - obstruction <ul style="list-style-type: none"> ➤ causes: thrombosis, embolism ➤ effect of vascular obstruction leading to oedema - heamorrhage
	10-11.	Immunology <ul style="list-style-type: none"> - specific and non-specific immunity - immune response, antigen, antibodies, compliment, humoral cell mediated response Diseases of the immune system <ul style="list-style-type: none"> - hypersensitivity reactions - auto-immune disease, tolerance - immune deficiency diseases
	12.	Disturbances of growth <ul style="list-style-type: none"> - hyperplasia - hypertrophy - atrophy - dysplasia - metaplasia
	13-14.	Neoplasia <ul style="list-style-type: none"> - definition and classifications - general features of benign and malignant tumors - effects and complication of benign and malignant tumors - tumor of epithelial, connective, muscular and nervous tissues - carcinogenesis - brief discussion on diagnosis of tumors and treatment

Examination:	<i>Written & practical examination:</i> First Mid Term Examination: 15 Second Mid Term Examination: 15 Laboratory Quizzes: 5 Mid Term Practical Examination: 5 Final Practical Examination: 20 Final Theoretical Examination: 40
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Course Description

Course number: CLS 322	Course title: Histological Techniques
Level/semester	6th level / 2nd Semester
Credit hours:	Thereof lecture hours: 1
	Thereof practical hours: 1
Language:	English
Aims and goals/ skills of the course:	This course will provide the student with the basic knowledge in the techniques of tissue preparation, staining and examination under the light microscope. Knowledge will be focused mainly on the paraffin technique; however, other histological methods will be covered. Also, the student will be instructed how to use the light microscope properly. An idea about other types of microscope will be provided.

	Weeks	Subjects
Content of the course:	1.	Introduction to Microtechniques Lab tools, rules & safety
	2.	Different histological methods (paraffin, celloidin, cryostat) Fresh unfixed tissue; teased, squashed, smear, impression, frozen techniques
	3.	Tissue processing (manual, automated) Upon obtaining the specimen Narcotization Steps of tissue preparation
	4.	Fixation (purpose, effects, methods, types)
	5.	Dehydration and clearing
	6.	Infiltration and embedding Types of wax, other embedding media
	7.	Sectioning: 1) Microtome, Types, components, techniques, and care 2) Microtome knife; types, sharpening3) Sectioning
	8.	Affixation and mounting Staining: Definitions Theory, mechanism, Types,
	9.	Principle of light microscope, Theory of magnification & resolution Components, Definitions
	10.	Dark field microscope, Fluorescent microscope
	11.	Polarized microscope Phase contrast microscope
	12.	Discussion
	13.	Revision
Examination:	<i>Written & practical examination,</i> First Mid Term Examination 15 Second Mid Term Examination 15 Final Practical Examination 30 Final Written Examination 40	

Course Description

Course number: CLS 323	Course title: General Pathophysiology
Level/semester	5 th level / 2 nd Semester
Credit hours:	Thereof lecture hours: 2
	Thereof practical hours: 0
Language:	English

Aims and goals/ skills of the course:	At the completion of this course the student will know the normal structure and functions of the body systems studied. Student should be able to understand the pathophysiology of the most common diseases, its manifestations and the diagnostic methods used.														
Content of the course:	<table border="1"> <thead> <tr> <th>Weeks</th> <th>Subjects</th> </tr> </thead> <tbody> <tr> <td>1,2,3,4.</td> <td> Cardiovascular System <ul style="list-style-type: none"> - Physiology and Manifestations - Congenital Heart Disease, Valvular Disease, Rheumatic disease - Vascular Disease, Atherosclerosis, Ischemic Heart disease - Hypertension, Hypotension, Heart Failure </td> </tr> <tr> <td>5,6,7,8.</td> <td> Respiratory System <ul style="list-style-type: none"> - Physiology and Manifestations - Pneumonia, Tuberculosis - Obstructive Disease - Respiratory Failure </td> </tr> <tr> <td>9.</td> <td> Female Genital System <ul style="list-style-type: none"> - Physiology and Manifestations - Causes of Abnormal Uterine Bleeding, Toxemia </td> </tr> <tr> <td>10,11,12.</td> <td> Urinary System <ul style="list-style-type: none"> - Physiology and Manifestations - Glomerulonephritis, Causes of Urinary Obstruction - Renal Failure </td> </tr> <tr> <td>13.</td> <td> Digestive System <ul style="list-style-type: none"> - Physiology and Manifestations - Common diseases of the digestive system </td> </tr> <tr> <td>14,15.</td> <td> Endocrine System <ul style="list-style-type: none"> - Physiology and Manifestations - Common endocrine diseases </td> </tr> </tbody> </table>	Weeks	Subjects	1,2,3,4.	Cardiovascular System <ul style="list-style-type: none"> - Physiology and Manifestations - Congenital Heart Disease, Valvular Disease, Rheumatic disease - Vascular Disease, Atherosclerosis, Ischemic Heart disease - Hypertension, Hypotension, Heart Failure 	5,6,7,8.	Respiratory System <ul style="list-style-type: none"> - Physiology and Manifestations - Pneumonia, Tuberculosis - Obstructive Disease - Respiratory Failure 	9.	Female Genital System <ul style="list-style-type: none"> - Physiology and Manifestations - Causes of Abnormal Uterine Bleeding, Toxemia 	10,11,12.	Urinary System <ul style="list-style-type: none"> - Physiology and Manifestations - Glomerulonephritis, Causes of Urinary Obstruction - Renal Failure 	13.	Digestive System <ul style="list-style-type: none"> - Physiology and Manifestations - Common diseases of the digestive system 	14,15.	Endocrine System <ul style="list-style-type: none"> - Physiology and Manifestations - Common endocrine diseases
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9.	Female Genital System <ul style="list-style-type: none"> - Physiology and Manifestations - Causes of Abnormal Uterine Bleeding, Toxemia 														
10,11,12.	Urinary System <ul style="list-style-type: none"> - Physiology and Manifestations - Glomerulonephritis, Causes of Urinary Obstruction - Renal Failure 														
13.	Digestive System <ul style="list-style-type: none"> - Physiology and Manifestations - Common diseases of the digestive system 														
14,15.	Endocrine System <ul style="list-style-type: none"> - Physiology and Manifestations - Common endocrine diseases 														
Examination:	<i>Written examination,</i> First Mid Term Examination: 20 Second Mid Term Examination: 20 Presentation 20 Final Theoretical Examination: 40														

Course Description

Course number: CLS 324	Course title: Principles of Electron Microscopy
Level/semester	6th level / 2nd Semester
Credit hours:	Thereof lecture hours: 1
	Thereof practical hours: 1
Language:	English

Aims and goals/ skills of the course:	This course will provide the student with the basic knowledge in the theory of magnification and resolution, knowledge about the structure of the electron microscope and its operation, techniques of tissue processing; preparation, and staining. Knowledge will be focused mainly on the avoidance of the artifacts. Students will be informed about some special techniques, scanning electron microscope and dark room.																										
Content of the course:	<table border="1"> <thead> <tr> <th>Weeks</th> <th>Subjects</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Introduction to electron microscopic unit Rules & safety and administration</td> </tr> <tr> <td>2.</td> <td>Lab orientation, Component of the unit Unit precautions Equipments, Lab tools machines, rules and principles</td> </tr> <tr> <td>3.</td> <td>Theory of magnification and resolution</td> </tr> <tr> <td>4.</td> <td>Structure of the electron microscope; electron gun, electromagnetic lens, comparison between LM & EM</td> </tr> <tr> <td>5.</td> <td>Operation of the EM</td> </tr> <tr> <td>6.</td> <td>Processing of a specimen to TEM Obtaining a specimen, fixation, dehydration and clearing</td> </tr> <tr> <td>7.</td> <td>Infiltration, embedding and sectioning</td> </tr> <tr> <td>8.</td> <td>Artifacts, definition, types, avoidance</td> </tr> <tr> <td>9.</td> <td>, chatter, knife marks ..</td> </tr> <tr> <td>10.</td> <td>Spécial techniques, perfusion fixation, decalcification</td> </tr> <tr> <td>11.</td> <td>Scanning electron microscope, SEM versus TEM</td> </tr> <tr> <td>12.</td> <td>Dark room</td> </tr> </tbody> </table>	Weeks	Subjects	1.	Introduction to electron microscopic unit Rules & safety and administration	2.	Lab orientation, Component of the unit Unit precautions Equipments, Lab tools machines, rules and principles	3.	Theory of magnification and resolution	4.	Structure of the electron microscope; electron gun, electromagnetic lens, comparison between LM & EM	5.	Operation of the EM	6.	Processing of a specimen to TEM Obtaining a specimen, fixation, dehydration and clearing	7.	Infiltration, embedding and sectioning	8.	Artifacts, definition, types, avoidance	9.	, chatter, knife marks ..	10.	Spécial techniques, perfusion fixation, decalcification	11.	Scanning electron microscope, SEM versus TEM	12.	Dark room
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Examination:	<p><i>Written & practical examination</i></p> <p>First Mid Term Examination: 15 Second Mid Term Examination: 15 Laboratory Quizzes: 10 Final Practical Examination: 20 Final Theoretical Examination: 40</p>																										

Course Description

Course number: CLS 331	Course title: Clinical Biochemistry (II)
Level/semester	5 th level / 2 nd Semester
Credit hours:	Thereof lecture hours: 3
	Thereof practical hours: 1
Language:	English

Aims and goals/ skills of the course:	Course work involves a study of the metabolic activity of animal tissue and its regulation. Major catabolic pathways related to carbohydrate, amino acids, and fatty acids are discussed in detail . the study includes a look at the bioenergetics of cells as well as the digestion and absorption of food material .
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	<p>Weeks</p> <p>Subjects</p>
<p>Content of the course:</p>	<p>1. General introduction</p> <ul style="list-style-type: none"> - Metabolic pathways - Catabolism and Anabolism - Regulation of metabolic activity
	<p>2. Digestion and Absorption</p> <ul style="list-style-type: none"> - Photometry - Role of vitamins in metabolism
	<p>3. Bioenergetics</p> <ul style="list-style-type: none"> - The role and chemistry of ATP - Standard free energy change of biochemical reactions
	<p>4. Glycolysis</p> <ul style="list-style-type: none"> - Regulatory enzymes of glycolysis
	<p>5. The citric acid cycle</p> <ul style="list-style-type: none"> - Regulation of carbohydrate catabolism
	<p>6. The Electron Transport chain & oxidative phosphorylation</p> <ul style="list-style-type: none"> - The energetic value of glucose
	<p>7. The pentose phosphate shunt and gluconeogenesis</p>
	<p>8. Glycogen metabolism</p> <ul style="list-style-type: none"> - The glycogen storage diseases
	<p>9. Oxidative degradation of amino acids</p> <ul style="list-style-type: none"> - The synthesis of urea
	<p>10. Introduction to Inborn Errors of Metabolism</p>
	<p>11. Oxidation of fatty acids in animal tissue</p> <ul style="list-style-type: none"> - B – oxidation pathway
	<p>12,13. Hormones and their metabolic regulatory role</p>
<p>Examination:</p>	<p><i>Written & practical examination</i></p> <p>First Mid Term Examination: 15 Second Mid Term Examination: 15 Laboratory Work and Reports: 15 Final Practical Examination: 15 Final Theoretical Examination: 40</p>

Course Description

Course number: CLS 332	Course title: Instrumental Analysis
Level/semester	5th level / 2nd Semester
Credit hours:	Thereof lecture hours: 3
	Thereof practical hours: 1
Language:	English

Aims and goals/ skills of the course:	<p>The knowledge of the principles of instrumentation is essential for a clinical laboratory technologist which can be utilized data. A good understanding of the principles of instrumentation along with the fundamentals of electronics applicable to laboratory instruments is offered in the course. This will prepare the laboratory technologist to adopt analytical procedures to the instruments of the future.</p>
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	Weeks	Subjects
Content of the course:	1.	Introduction
		<ul style="list-style-type: none"> - Electromagnetic radiation, Absorption spectroscopy - Spectrophotometric techniques, Application of Beer's law, Visible absorption spectrophotometer, - Components and applications
	2.	Atomic absorption spectrophotometer
		<ul style="list-style-type: none"> - Principle, basic components and their function - Flameless atomic absorption spectrophotometer
	3.	Emission spectroscopy
		<ul style="list-style-type: none"> - Luminescence, Fluorometers - Fluorometers v/s conventional spectrophotometers - Instrumentation, Possible disadvantages, solutions - Special application of fluorometers
	4.	Light scattering phenomenon
		<ul style="list-style-type: none"> - Turbidity and nephelometry - Nephelometer v/s spectrophotometer
	5.	Flame photometry
		<ul style="list-style-type: none"> - Internal standard in flame photometry - Advantages/disadvantages
	6.	Osmometry
		<ul style="list-style-type: none"> - Osmosis, colligative properties Osmolality/osmolality - Osmometers, Freezing point osmometers - Vapor pressure osmometers
	7.	Ion selective electrodes
	<ul style="list-style-type: none"> - Types of electrodes, principle and function - Reference electrodes, Glass pH electrodes - Precipitate electrodes, Solid state electrodes - PCO₂ and PO electrodes 	
8.	Electrophoretic techniques	
	<ul style="list-style-type: none"> - Introduction, Buffers, support materials - Endosmosis, Factors affecting the migration rate - Clinical applications of electrophoresis 	
9.	Chromatographic techniques	
	<ul style="list-style-type: none"> - General principles, Physical basis of separation - Adsorption (liquid- solid) 	
10.	Partition (liquid- liquid)	
	<ul style="list-style-type: none"> - Gel filtration (steric exclusion) - Ion exchange chromatography 	
11.	Thin layer chromatography	
	<ul style="list-style-type: none"> - High performance liquid chromatography - Gas chromatography 	
12.	Automated procedures	
	<ul style="list-style-type: none"> - Basic concepts, operation, trouble shooting - Automatic dispensers (dilutors), Types of automated equipment, Continuous flow analyzers Discrete analysers 	
13.	Single channel instruments	
	<ul style="list-style-type: none"> - Discontinuous operation - (Batch processing, single specimen) - Multichannel instruments - Small instruments...six channels - Large instruments...non discrete, discrete - Centrifugal analysers 	

Examination:	<i>Written & practical examination</i> First Mid Term Examination: 15 Second Mid Term Examination: 15 Laboratory Work and Reports: 15 Final Practical Examination: 15 Final Theoretical Examination: 40
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Course Description

Course number: CLS 333	Course title: . Clinical Biochemistry III		
Level/semester: 6			
Credit hours: 4 hours	Thereof lecture hours: 3 hour		
	Thereof practical hours: 1 hour		
Language: English			
Aims and goals/ skills of the course:	This is a required course in biochemistry for preparing a generalist in medical technology program. The course will provide a useful application of a basic biochemistry along with physiological chemistry in developing an appreciation of the clinical significance of the test methodology, and interpretation of test results.		
Content of the course:	Topics	Planned Contact Hours	Actual Contact Hours
	Disorders of carbohydrate metabolism (2 weeks)	6	6
	Disorders of aminoacid metabolism (1 weeks)	3	3
	Protein in bodyfluids (1 weeks)	3	3
	Disorders of lipid metabolism (1 weeks)	3	3
	Liver function and Liver Diseases (1 week)	6	6
	Biochemical tests of liver function (1 week)	3	3
	Electrolytes of blood gases (1 week)	3	3
	Renal function and Renal Diseases (2 week)	6	6
	Biochemical Tests of Renal Function (1 week)	3	3
	Clinical Enzymology (1 week)	3	3
	Gastrointestinal Function and diseases (1 week)	3	3
	Endocrine Function Tests (1 week)	3	3
	Ovarian/Testicular Function Tests (1 week)	3	3
Examination:	Midterm examination (15%), Reports (15%) and Final written examination (40%) and Lab sessions (15%) and Final lab examination (15%)		

Course Description

Course number: CLS 411	Course title: Clinical Bacteriology I	
Level/semester: Level 7 / both semesters		
Credit hours:	Thereof lecture hours: 2	
	Thereof practical hours: 1	
Language: English		
Aims and goals/ skills of the course:	<p>The first part of this course deals with the theoretical and practical aspects of chemotherapeutic agents, their modes of action, methods of evaluation, susceptibility testing, and mechanisms of microbial resistance.</p> <p>The second part of the course describes the mechanisms of host parasite relationships, followed by a detailed study of the structure and physiology of Gram positive cocci and Gram negative cocci, the aerobic spore and non-spore forming bacilli, and the Mycobacteria. The diseases caused by these organisms, the clinical presentation, pathogenesis, modes of transmission, laboratory diagnosis, antibiotic susceptibility testing, prevention and control will be fully discussed.</p>	
Content of the course:	Weeks	Subjects
	<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13 14. 	<p>Chemotherapeutic agents / Antibiotics – Definition, Modes of action, methods of evaluation</p> <p>Antibiotics cont... mechanisms of resistance, Susceptibility testing</p> <p>Staphylococci and Micrococci</p> <p>Streptococci – The Beta haemolytic streptococci</p> <p>Alpha haemolytic Viridans streptococci, & Streptococcus pneumoniae Non-haemolytic streptococci (Enterococci)</p> <p>Neisseria, Moraxella, Kingella, Eikenella & Acinetobacter</p> <p>Aerococcus, Peptococcus, Veillonella, and Gemella</p> <p>Corynebacteria</p> <p>Listeria, Erysipelothrix, Lactobacilli, Kurthia</p> <p>Mycobacteria – M. tuberculosis and M. leprae</p> <p>The Atypical Mycobacteria</p> <p>Actinomycetes & Nocardia</p> <p>The aerobic spore bearers – Bacilli Bacillus anthracis, Bacillus cereus and other spore forming-bacilli</p> <p>Fastidious gram negative rods: Legionella, Francisella, Gardnerella, Pasteurella and Calymmatobacterium granulomatis</p>
Examination:	<i>written examination, home work reports, practical examination 30%</i>	

Course Description

Prof.Mohd Zahedi Daud

Course number: CLS412	Course title: Medical Parasitology
Level/semester:	Semester (7) Year (4)
Credit hours: 4	The Lecture hours: 3 X 15 = 45 hours
	The Practical hours: 2 X 15 = 30 hours
Language : English	

**Aims and goals/ skills
of the course:**

a) Students should be able to appreciate the parasites' life-cycle, their behavior in the environment, and the disease they caused. Basic biochemistry and host specificity, mechanisms of evasion of host's immune responses are discussed.

b) Students are exposed to drugs commonly used against human parasites, and disease control strategies. The epidemiology of the disease and the control strategies are discussed in the context of the local environment.

c) Students are to be competent public health workers, and should be able to advise the public in control strategies against parasitic diseases.

d) Current issues in medical parasitology are introduced; topics cover new emerging diseases and the impact/implication these diseases on public health.

e) Students are encouraged to do text-book-based or IT-based self-studies.

g) Students do laboratory (practical work) sessions; they are exposed to permanent mount parasites or in fresh biological specimens. Students are also taught how to isolate parasites and to do simple diagnostic test techniques. They are trained to be competent laboratory personnel, able to isolate, process and stain, and identify human parasites of importance

thus at the end of the day:

Students are exposed to various species of human and animal parasites of public health importance, their life cycles and the diseases they caused. The epidemiology of these parasitic diseases and their control are discussed in the context of the local community and environment.

Students are expected to be able to describe the parasites, the diseases they caused, and able to isolate, mount and identify most of the common parasites at the species level. Parasites isolation and identification are by the classical morphology-based methods or by advanced biotech tools.

Teaching and learning processes are by formal lectures, tutorials, practical laboratory sessions, and supplemented with self-study and group discussions. Students are required to write term papers/assignments, and are regularly assessed by lecture-room quizzers. Small group discussions, and informal meetings with the lecturer and laboratory staff further enhance the teaching and learning strategies.

Course Content

Introduction to Parasitology

- terminology
- general parasite morphology and biology
- parasite and the environment
- parasite epidemiology
- control strategies

Parasites of the Digestive system

- intestinal protozoa eg *Entamoeba histolytica*
- intestinal nematodes eg *Ascaris lumbricoides*
- intestinal trematodes and cestodes eg flukes and tapeworms

Parasites of the Circulatory System

- blood protozoa eg *Plasmodium* spp.
- blood nematodes eg filarial worms
- blood flukes eg *Schistosoma* spp.

Parasites of the Musculo-Skeletal System

- protozoa eg *Leishmania* spp.
- nematodes eg *Dracunculus medinensis*., *Trichinella spiralis*
- cestodes eg *Taenia solium*

Parasites of the Nervous System

- protozoa eg *Naegleria fowleri*., *Trypanosoma* spp.
- nematodes eg *Toxocara* spp
- cestodes eg *Taenia solium*

Parasites of Urogenital and Reproductive System

- protozoa eg *Trichomonas vaginalis*
- trematodes eg *Schistosoma haematobium*

Parasites of the Respiratory System

- nematodes eg larval stages of soil transmitted helminths
- cestodes eg hydatid cysts of *Echinococcus* spp.
- trematodes eg *Paragonimus westermani*

Parasites of the Eye

- protozoa eg *Toxoplasma gondii*
- nematodes eg larval stages of filarial worms and *Toxocara* spp.
- incidental infection with larval stages of animal parasites

Zoonotic Diseases (1)

- introduction to zoonosis
- epidemiology of zoonotic diseases
- control strategies

Zoonotic Diseases (2)

- introduction to common zoonotic diseases
- zoonotic diseases in the Kingdom of Saudi Arabia

Zoonotic Diseases (3)

- emerging zoonotic diseases eg *Cryptosporidiosis*
- protozoa eg *Babesiosis*.,
- nematode eg *Capillaria philippinensis*
- animal trematodes and cestodes eg *Hymenolepis nana*, *Opisthorchis felinus*

Medical Entomology (1)

- introduction to medical entomology
- insects and human diseases eg vector mosquitoes
- control strategies

Medical Entomology (3)

- Insects and other invertebrates infestation eg scabies by *Sarcoptes scabiae*., body lice *Pediculus* spp. and *Pthirus pubis*
- Scrub typhus
- *Aedes* spp. as vectors of yellow fever and dengue
- Flies and myiasis; the forensic importance of insects

Special Topics

- HIV/AIDS and parasitic diseases
- Urban Development and Dengue
- Human Migration and Parasitic Diseases
- Zoonotic Diseases of Public Health Importance in KSA

Content of the course:

Examination:	<p>Examination: Quizzes once every fortnight 6% Mid-Semester Examination 18% Final Semester Examination 40% Assignments (2 term papers) 6% Practical Examinations 30%</p> <p><i>Examinations papers consisted of MCQs, True/False, Fill in Blanks and Short Essays</i></p>
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Course Description

Course number: CLS 413	Course title: : Clinical Bacteriology (II)
Level/semester	8th level / 2nd Semester
Credit hours:	Thereof lecture hours: 2
	Thereof practical hours: 1
Language:	English
Aims and goals/ skills of the course:	This course is a follow-up to CLS 411 and completes the Clinical Bacteriology courses. It deals with the study of structure and physiology of Gram-negative bacteria to include the tribes of Enterobacteriaceae, the species of the following genera or groups: Pseudomonads, Vibrio , Campylobacter, Helicobacter, Bordetella, Brucella, Haemophilus, Legionella and related organisms , Spirochaetes, the anaerobic bacteria, Mycoplasmas, Chlamydia. The diseases caused by these organisms, the clinical presentation, pathogenesis, modes of transmission, laboratory diagnosis, antibiotic susceptibility testing, prevention and control will be fully discussed

	Weeks	Subjects	
Content of the course:	1.	The Enterobacteriaceae: The different genera making up the group 'Enterobacteriaceae'. Their characteristics and growth identifications.	
	2.	Enterobacteriaceae cont... Medical importance of members of this group of organisms, the disease they cause	
Examination:	3.	Enterobacteriaceae cont... Pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	4.	PSEUDOMONADS and glucose non-fermentors G(-)rods	
	5.	The small Gram negative rods: Haemophilus, Brucella, and Bordetella, and HACEK – Characteristics and growth	
	6.	The small Gram negative rods cont... diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	7.	The curved G(-) rods, Vibrios: characteristics, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	8.	Microaerophilic ,Species of Campylobacter and Helicobacter: Characteristics, species of medical importance, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	9.	The Spirochaetes: Treponema species, characteristics, species of medical importance, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	10.	The Spirochaetes cont... Species of Borrelia, Leptospira - characteristics, species of medical importance, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	11.	The anaerobes: Peptococcus, Peptostreptococcus, The Lactobacilli, Propionibacteria Veillonella- characteristics, species of medical importance, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	12.	The Clostridia: The pathogenic species, characteristics, species of medical importance, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	13.	The Clostridia cont... The Bacteroides species; characteristics, species of medical importance, diseases they cause, clinical presentation, pathogenesis, modes of transmission, antibiotic susceptibility, prevention and control	
	14.	Mycoplasma, Chlamydia ,and the Rickettsia group:: The medically important species, characteristics, and the diseases they cause.	
		<i>Written & practical examination</i>	
		Mid Term Examination:	20
	Mid Term Practical Examination:	15	
	Absentees & reports	5	
	Final Practical Examination:	20	
	Final Theoretical Examination:	40	

Course Description: Immunology (CLS 414)

Course number: CLS 414	Course title: Immunology
Level/semester:	8 th level /2 nd semester
Credit hours: 4 hrs	Thereof lecture hours: 3 hrs
	Thereof practical hours: 2 hrs
Language:	English language

Aims and goals/ skills of the course:	<p>This course is designed to give a basic understanding of theoretical and practical aspects of immunology. The first part of the course deals with the basic aspects of Immunology – Types of immunity, immune response, characterization of antigens, the humoral response (different classes of antibodies), the Complement system, the cellular response (different types of T cells and their functions, the cytokines), the immune regulation. The second part of the course covers the Clinical aspects of immunology Immunopathology, immunity to microbial infections, types of hypersensitivity reactions, auto-immune diseases,immunodeficiency diseases, transplantation, tissue typing and rejection.</p>
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CLS 414: Lectures Outline

Weeks

Subjects

1. Introduction: history and terminology
Types of immunity (natural and acquired immunity)
2. Innate (natural) immunity, parameters and mechanism
3. Antigens, immunogenicity, types of antigens & mitogens
4. Organs and tissue of the immune system, primary and secondary lymphoid organs
5. Cells involved in immune responses - types and subtypes, sites of their developments - their functions
6. The immune response: humoral response, primary and secondary immune response , primary and secondary immune response, mechanism of antibody production
7. Antibodies: structure, classes, subclasses and characters of immunoglobulins as well as their functions and uses
8. Monoclonal antibodies, hybridoma technology, and their applications. Anti-idiotypic antibodies and their uses
9. Complement system: characters, mechanism of activation, biological functions and techniques involving complement
10. Major Histocompatibility Complex (MHC) antigens, Human leukocytes Antigens (HLA). Cellular distribution, structure and functions of MHC antigens.
11. The cellular immune response: mechanism of cytotoxicity reactions and measurement of cytotoxicity *in-vitro*, types and functions of cytokines. Treg cells
12. Immunoregulation and immunoprophylaxis
Clinical Immunology: Immunity to microbial infections
13. Immunopathology: Types of hypersensitivity (Types 1, II, III, and IV)
14. Transplantation and Tissue typing, mechanism of tissue rejection
15. Autoimmune diseases and immunodeficiency diseases

Content of the course:

	<i>written examination</i>
Examination: Assessments:	1st Mid Term Examination: Written 10
	2nd Mid Term Examination: Written 10
	Mid Term Examination: Practical 10
	Final Practical Examination: 20
	Oral Examination: 10
	Final Theoretical Examination: 40

Total: 100	

Course Description

Course number: 415	Course title: Virology																		
Level/semester: 8 th Second semester																			
Credit hours: 2	Thereof lecture hours: 2																		
	Thereof practical hours: 0																		
Language: English																			
Aims and goals/ skills of the course:	<ol style="list-style-type: none"> To Recognize clinically important viruses and their classification, morphology and replication. To describe the diseases caused by these viruses, the clinical presentation, pathogenesis, modes of transmission, laboratory diagnosis, treatment and prevention and control. 																		
Content of the course:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">1. CONTENTS COVERED</th> </tr> </thead> <tbody> <tr><td>Introduction: history and terminology and structure of the virus</td></tr> <tr><td>Virus characters – physical and biochemical</td></tr> <tr><td>Basis of virus classification</td></tr> <tr><td>Virus replication cycle (virus-cell relationship)</td></tr> <tr><td>Virus pathogenesis and virus immunity</td></tr> <tr><td>Laboratory identification of viruses in clinical specimens: Direct diagnosis based on isolation, morphological and biochemical characters</td></tr> <tr><td>Laboratory diagnosis of viruses in clinical specimens: Serological identification, Molecular diagnosis based on identification of virus nucleic acid, using DNA probe, and PCR</td></tr> <tr><td>Hepatitis viruses (HAV, HEV, HDV and TTV) Characters, epidemiology, pathogenesis and laboratory diagnosis</td></tr> <tr><td>Hepatitis viruses (HBV & HCV) – Characters, epidemiology, pathogenesis and laboratory diagnosis</td></tr> <tr><td>Retroviruses: Human Immunodeficiency Virus (HIV): HTLV_I, HTLV_{II} characteristics, pathogenesis, epidemiology and laboratory diagnosis</td></tr> <tr><td>Herpes viruses: Types, characteristics, importance and laboratory diagnosis</td></tr> <tr><td>Encephalitis viruses: Characteristics, pathogenesis and laboratory diagnosis, Picornaviruses</td></tr> <tr><td>Meningitis viruses: Characteristics, pathogenesis and laboratory diagnosis, RTI</td></tr> <tr><td>Viral vaccines an anti-virus therapy</td></tr> <tr><td>Rabies, measles, mumps, rubella</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </tbody> </table>	1. CONTENTS COVERED	Introduction: history and terminology and structure of the virus	Virus characters – physical and biochemical	Basis of virus classification	Virus replication cycle (virus-cell relationship)	Virus pathogenesis and virus immunity	Laboratory identification of viruses in clinical specimens: Direct diagnosis based on isolation, morphological and biochemical characters	Laboratory diagnosis of viruses in clinical specimens: Serological identification, Molecular diagnosis based on identification of virus nucleic acid, using DNA probe, and PCR	Hepatitis viruses (HAV, HEV, HDV and TTV) Characters, epidemiology, pathogenesis and laboratory diagnosis	Hepatitis viruses (HBV & HCV) – Characters, epidemiology, pathogenesis and laboratory diagnosis	Retroviruses: Human Immunodeficiency Virus (HIV): HTLV _I , HTLV _{II} characteristics, pathogenesis, epidemiology and laboratory diagnosis	Herpes viruses: Types, characteristics, importance and laboratory diagnosis	Encephalitis viruses: Characteristics, pathogenesis and laboratory diagnosis, Picornaviruses	Meningitis viruses: Characteristics, pathogenesis and laboratory diagnosis, RTI	Viral vaccines an anti-virus therapy	Rabies, measles, mumps, rubella		
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Viral vaccines an anti-virus therapy																			
Rabies, measles, mumps, rubella																			
Examination:	First midterm examination (30%), second midterm examination (25%), Final examination (40%). Oral exam.(5%)																		

Course Description

Course number: CLS 416	Course title: Environmental Microbiology
Level/semester	9th level / 2nd Semester
Credit hours:	Thereof lecture hours: 1
	Thereof practical hours: 1
Language:	English
Aims and goals/ skills of the course:	This course is designed to provide the students with an understanding of the vital activities that microorganisms perform in nature and in the broader dimension of organic activities in the total ecosystem. Students will learn about the useful and harmful roles of microorganisms in the food and dairy industries. The use of microorganisms in industrial processes, the treatment of waste materials and microbial quality controls will also be discussed.

	<p>Weeks</p> <p>Subjects</p>
<p>Content of the course:</p>	<p>1. Fundamentals of microbial ecology- Characteristics of microbial ecosystems, microorganisms and their ability to cause changes; Adaptation</p>
	<p>2. Microbial symbiosis: Neutralism, mutualism, comensalism, antagonism, competition, parasitism and predation</p>
	<p>3. Epidemiology of infectious diseases: Terminology, disease reservoirs, modes of transmission, and public health measures for the control of epidemics</p>
	<p>4. Epidemiology of zoonotic diseases: Viral, bacterial, and parasitic zoonoses; prevention and control of zoonotic diseases</p>
	<p>5. Air Microbiology – Indoor and outdoor air, airborne diseases and its transmission, control of microorganisms in the air</p>
	<p>6. Water Microbiology – Water sources, microbial content of water, pollution of water</p>
	<p>7. Environmental sanitation: Types of sewer lines, treatment of sewage, sewage transmitted diseases</p>
	<p>8. Microorganisms involved in the spoilage of different types of food and milk</p>
	<p>9. Microorganisms involved in the spoilage of food continued ... Food borne diseases: Infection, intoxication;</p>
	<p>10. Food borne diseases continued ... Infection, intoxication; prevention and control of food borne diseases</p>
	<p>11. Nosocomial infections: Predisposing factors, endogenous and exogenous infections, sources, control measures</p>
	<p>12. Laboratory acquired infections: Classification of organisms into Risk groups, safety precautions when handling each Risk group, hazardous laboratory techniques and processes</p>
	<p>13. Microbial production processes: Characteristics of microbial fermenters, different types of microbial processes – dairy, pharmaceutical, single cell protein</p>
<p>Examination:</p>	<p><i>Written & practical examination</i> First Mid Term Examination: 15 Second Mid Term Examination: 15 Laboratory Quizzes: 5 Mid Term Practical Examination: 5 Final Practical Examination: 20 Final Theoretical Examination: 40</p>

Course Description

Course number: CLS 417	Course title: Clinical Practice in Microbiology
Level/semester	9 th level / 2 nd Semester
Credit hours:	Thereof lecture hours: 1
	Thereof practical hours: 2
Language:	English

Aims and goals/ skills of the course:	<p>This final microbiology course involves lectures as well as practical sessions in a hospital Microbiology laboratory. The lectures will deal mainly with specimens received in the bacteriology laboratory, their collection, suitability, and processing. The students will be introduced to the safety measures implemented in the laboratories. They will learn about culture media preparation and sterilization, processing of specimens, isolation/ identification of organisms, and antibiotic susceptibility testing. The diagnostic techniques in the routine Clinical Immunology, Mycology and Virology laboratories will also be taught</p>
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	<p>Weeks</p> <p>Subjects</p>	
<p>Content of the course:</p>	<p>1. Bacteriological culture media Basic constituents / preparation / sterilisation Types of bacteriological culture media</p> <p>2. Urine Specimens – Types of / collection Processing for chemical analysis</p> <p>3. Bacteriology of urine specimens continued ... Pathogens isolated from urine specimens Processing of urine specimens for routine culture sterile pyuria</p> <p>4. Blood culture /Indications for Timing and technique for blood collection Manual / Automated processing of blood culture</p> <p>5. Sputum culture / Indication for / Collection Processing of sputum in routine respiratory tract infections</p> <p>6. Processing of sputum in pulmonary tuberculosis by conventional / automated methods Antimycobacterial susceptibility testing by conventional and automated methods</p> <p>7. Stools specimens / indications for culture Pathogens isolated from faecal specimens</p> <p>8. Processing of stools for culture / Isolation and identification of different organisms</p> <p>9. Preparation of stools specimen for examination of parasites</p> <p>10. General bench specimens: CSF / Pus / Ear/ Conjunctiva / Genital / Nasal / Throat- indications for taking these specimens / collection / processing</p> <p>12. Commonly used serological tests in clinical bacteriology Widal / CFT / ASO , Serological test of syphilis specific and non-specific: RPR,VDRL,TPHA, FTA ,CRP, Pregnancy test, TORCH, organ transplant matching(MHC)& FC</p> <p>13. Rapid review in diagnosis of common viral infections. Tissue culture types- CPE CPE / EIA / Immunofluorescence</p> <p>14. Rapid review in diagnosis of common fungal infections - Microscopic examination and culture of specimens in Mycology</p>	
	<p>Examination:</p>	<p><i>Written & practical examination</i></p> <p>Mid Term Examination(1): 15</p> <p>Mid Term Examination(2) 15</p> <p>Absentees & reports 10</p> <p>Final Practical Examination: 20</p> <p>Final Theoretical Examination: 40</p>

Course Description: Pathophysiology (CLS 421)

Course number:CLS 421	Course title: Pathophysiology
Level/semester:	7th level /2nd semester
Credit hours: 3hrs	Thereof lecture hours: 2 hrs
	Thereof practical hours: 1 hr
Language:	English language
Aims and goals/ skills of the course:	At the completion of this course the student will know the normal structure and functions of the body systems studied. Student should be able to understand the pathophysiology of the most common diseases, its manifestations and the diagnostic methods used.

CLS 421: Lectures Outline

Content of the course:

Weeks

Subjects

1,2,3,4.

Cardiovascular System

- Physiology and Manifestations
- Congenital Heart Disease, Valvular Disease, Rheumatic disease
- Vascular Disease, Atherosclerosis, Ischemic Heart disease
- Hypertension, Hypotension, Heart Failure

5,6,7,8.

Respiratory System

- Physiology and Manifestations
- Pneumonia, Tuberculosis
- Obstructive Disease
- Respiratory Failure

9.

Female Genital System

- Physiology and Manifestations
- Causes of Abnormal Uterine Bleeding, Toxemia

10,11,12.

Urinary System

- Physiology and Manifestations
- Glomerulonephritis, Causes of Urinary Obstruction
- Renal Failure

13.

Digestive System

- Physiology and Manifestations
- Common diseases of the digestive system

14,15.

Endocrine System

- Physiology and Manifestations
- Common endocrine diseases

Examination: Assessments:	<i>written examination</i>	
	1st Mid Term Examination: Written	20
	2nd Mid Term Examination: Written	20
	Final Practical Examination:	20
	Final Theoretical Examination:	40

	Total:	100

Course Description

Course number: CLS 422	Course title: Cytopathology
Level/semester	8 th level / 2 nd Semester
Credit hours:	Thereof lecture hours: 1
	Thereof practical hours: 1
Language:	English

Aims and goals/ skills of the course:	This course will provide the student with the basic knowledge of the theory and practical aspect in the diagnosis of tumour cells and non-malignant conditions. This can be achieved by microscopic examination of smears prepared from exfoliated cells or fine needle aspirated material. The course will enable the student to identify through the microscope, the normal and malignant cells by which malignant tumours can be diagnosed. The students also will be trained in the different technical methods applied in smears preparation and self precautions from contacting infections.																								
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Examination:	<i>Written & practical examination</i>
	First Mid Term Examination: 15
	Second Mid Term Examination: 15
	Laboratory Quizzes: 5
	Mid Term Practical Examination: 5
	Final Practical Examination: 20
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Course Description

Course number: CLS 431	Course title: Clinical Enzymology																																
Level/semester: 8																																	
Credit hours: 2 hours	Thereof lecture hours: 1 hour																																
	Thereof practical hours: 1 credit hour (3 contact hours per week)																																
Language: English																																	
Aims and goals/ skills of the course:	<p>This course deals with the theoretical and practical aspects of the chemical structure, mechanisms of action and kinetics of various enzymes. Design of assay methodologies is included. The use of enzymes as clinical markers of disease related to liver, kidneys, intestines, pancreas, bones & muscles is extensively studied. On successful completion of the course the student must :</p> <ol style="list-style-type: none"> 1. Understand the chemical specificity of the enzyme structure 2. Be able to study the kinetics of an enzymatically catalysed reaction. 3. Be able to set up a biochemical assay of enzyme activity 4. Be able to differentially diagnose disease by analysing data of various serum enzyme levels. 																																
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Examination:	<p><i>Midterm examination (15%), Reports (15%) and Final written examination (40%) and Lab sessions (15%) and Final lab examination (15%)</i></p>																																

Course Description

Course number: CLS 432	Course title: Clinical Practice in Biochemistry,		
Level/semester: 8			
Credit hours: 2 hours	Thereof lecture hours: 1 hour		
	Thereof practical hours: 1 hour		
Language: English			
Aims and goals/ skills of the course:	This course is designed to train students in routine procedures performed in a biochemistry laboratory. Students are encouraged to look up and read review articles and recent advances in the clinical lab practice and changes related to metabolic disorders. In addition, students are expected to become familiar with the up-to-date methodologies related to early diagnosis of such disorders.		
Content of the course:	1 Topics to be Covered		
	Topic	No of Weeks	Contact hours
	1. Clinical Specimens safety precaution	1	1
	2. Quality control	2	1
	3. ELISA,EIA and RIA	3,4	2
	4. Electrophoresis	5,6	2
	5. Automated equipment	7,8	2
	6. Glucose, cholesterol, Tryglycerides, Urea,Creatinine	9	1
	7. Sodium,potassium,chloride,CO ₂ ,bilirubin,Albumin in Serum and Urine Samples.	10	1
	8. Amylase,ALP,ACP,ALT and AST	11	1
9. Review,Problem Solving,Critique	12,13	2	
Examination:	<i>Midterm examination (20%), Reports (20%) and Final written examination (40%) and Lab sessions (10%) and Final lab examination (20%)</i>		

Course Description

Course number: CLS 441	Course title: Immunohaematology
Level/semester	7 th level / 2 nd Semester
Credit hours:	Thereof lecture hours: 2
	Thereof practical hours: 2
Language:	English

Aims and goals/ skills of the course:	<p>The subject develops skills and knowledge required for proficiency in the safe supply of human blood products. A review of antibody antigen interaction will lead into the practical application of antibody screening, identification and compatibility testing. Quality assurance and safety of the blood supply will be recovered. Case study presentation will lead the student through problem solving incompatible reactions, situations they will likely encounter in a working laboratory. Advanced techniques and current developments in stem cell transplant and cord blood banking will also be discussed,</p>																																
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Examination:	<i>Written & practical examination</i> Mid Term Examination: 20 Mid Term Practical Examination: 20 Final Practical Examination: 20 Final Theoretical Examination: 40
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Course Description

Course number: CLS 442	Course title: Clinical Haematology Practices
Level/semester: level 9, first semester and second semester	
Credit hours:	Thereof lecture hours: 1 hr
	Thereof practical hours: 3 hours
Language: English	

Course description

The students will be introduced to and learn the working system of routine haematology laboratory and the Blood Bank. The need is for the students to follow the routine laboratory work starting from specimen collection right through to sending results to the clinicians. Some attention will be given to interpretation of results and identification and quick reporting of grossly abnormal life threatening results to the clinicians

In the blood bank, the students will be encouraged in participating in the production of blood products (packed cells, platelets concentrates, fresh frozen plasma etc .) and in the production of cryoprecipitate

AIMS:

1. become familiar with the haematology laboratory;
2. become proficient in basic diagnostic techniques used in a haematology laboratory and understand their use in classifying clinical pathology;
3. be able to identify the structure and function of cellular blood components;
4. understand normal haemostasis and techniques of its determination.
5. become proficient in the morphological interpretation of a blood film;
6. be able to relate changes in blood cell morphology to clinical pathology;
7. develop an understanding of the requirements of a safe blood supply;
8. become proficient in various techniques in antibody screening and identification;
9. become knowledgeable in techniques of compatibility testing and be able to problem solve incompatible reactions;
10. examine advanced applications;
11. achieve a level of proficiency required for employment in a medical laboratory

Aims and goals/ skills of the course:

<p>Content of the course:</p>	<p>1-Haemolytic anaemias: General and Inherited membrane and enzyme defects Bone marrow failure</p> <p>2-Chronic myeloid leukaemia</p> <p>3-Myelodysplasia</p> <p>4-Multiple myeloma</p> <p>5-Lymphoma: Hodgkin lymphoma, Non-Hodgkin lymphoma</p> <p>6-Disorders of haemostasis: vessel wall and platelets</p> <p>7-Disorders of coagulation: Inherited and Acquired</p> <p>8-Thrombosis and thrombophilia</p> <p>9 -Haematological aspects of disease: Renal, liver, endocrine pregnancy</p> <p>9-Blood transfusion and Stem cell transplantation</p> <p>10-Blood bank policy</p> <p>11-Complications of blood products</p> <p>12- Case studies</p> <p>13 Assessments of the course</p>
<p>Examination:</p>	<p>Written & practical examination</p> <p>Mid Term Examination: 20</p> <p>Mid Term Practical Examination: 20</p> <p>Final Practical Examination: 20</p> <p>Final Theoretical Examination: 40</p>

Course Description

Course number: CLS 451	Course title: Laboratory Management
Level/semester	9th level / 2nd Semester
Credit hours:	Thereof lecture hours: 2
	Thereof practical hours: 0
Language:	English

Aims and goals/ skills of the course:	The course is on the different types of medical laboratories, management functions, in clinical laboratories, organization and supervision involving laboratory design & space utilization, steps in clinical laboratory work flow, work schedule and work load measurements, productivity. Emphasis on quality control in clinical laboratories (choice of quality control materials), preventive maintenance and safety measures in quality control monitoring, education of laboratory personnel, budgeting consideration in clinical laboratory
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<p>Examination:</p>	<p><i>Written examination</i></p> <p>First Mid Term Examination: 30 Second Mid Term Examination: 30 Final Theoretical Examination: 40</p>																												

Course Description

Course number: CLS 452	Course title: Indepedant Studies
Level/semester: 9	
Credit hours: 2 hours	Thereof lecture hours: 2 hour
	Thereof practical hours: 0 hour
Language: English	
Aims and goals/ skills of the course:	<p>Is to let the student think, work and present his latest research review in front of his classmates and teachers. This will give a good idea about the student level, his ability to give the lectures in a impressive manner and to assess the level of understanding of the given topic and its presentation..</p> <p>Student ability to respond to the questions from teachers and students, the personality of the students and finally to evaluate their English language.</p>
Content of the course:	<p>In this course each student is given a virology topic to prepare it from different aspects such as</p> <ul style="list-style-type: none">- History of the disease and virus and its relation to present situation.- Clinical features and details of the disease and its diagnosis- Pathogenesis of the virus and the characteristic pathologic features.- Epidemeology and transmission of the disease, epidemic and pandemic.- Laboratory diagnosis of the viruses by different sensitive and specific methods such as EIA,IF NT and PCR etc.- People at risk of these viruses and the advice for them.- Control of the virus: By isolation of the patients, giving treatments,analgesic,antipyretic,vaccine,specific immunoglobulin and antiviral therapy.
Examination:	Written report (60%), Presentation (40%)

Course Description

Course number: CLS 453	Course title: Medical Genetics																																											
Level/semester: 9																																												
Credit hours: 3 hours	Thereof lecture hours: 2 hour																																											
	Thereof practical hours: 1 hour																																											
Language: English																																												
Aims and goals/ skills of the course:	This course is designed to give a basic understanding of the theoretical and practical aspects of medical genetics. In addition to molecular medical genetics, topics such as cytogenetics, DNA, RNA, mutation, mutation detection technique, PCR, cloning, population genetics are also taught. In practical sessions, the commonly used techniques such as gel electrophoresis, DNA & RNA extractions, PCR, RFLP methods and Bioinformatics will be trained.																																											
Content of the course:	<table border="1"> <thead> <tr> <th colspan="3">1 Topics to be Covered</th> </tr> <tr> <th>Topic</th> <th>No of Weeks</th> <th>Contact hours</th> </tr> </thead> <tbody> <tr> <td>1. History of Genetics</td> <td>1</td> <td>1</td> </tr> <tr> <td>2. The Cell</td> <td>1</td> <td>1</td> </tr> <tr> <td>3. Cytogenetics (Chromosomes)</td> <td>1</td> <td>1</td> </tr> <tr> <td>4. DNA structure and function</td> <td>1</td> <td>1</td> </tr> <tr> <td>5. Mutation</td> <td>1</td> <td>1</td> </tr> <tr> <td>6. Mutation detection techniques</td> <td>1</td> <td>1</td> </tr> <tr> <td>7. PCR</td> <td>1</td> <td>1</td> </tr> <tr> <td>8. Cloning</td> <td>1</td> <td>1</td> </tr> <tr> <td>9. Population Genetics</td> <td>1</td> <td>1</td> </tr> <tr> <td>10. Clinical Genetics and Genetic disorders</td> <td>1</td> <td>1</td> </tr> <tr> <td>11. Chromosomal Disorders</td> <td>1</td> <td>1</td> </tr> <tr> <td>12. Sickle Cell Anaemia & Thalassemia</td> <td>1</td> <td>1</td> </tr> </tbody> </table>		1 Topics to be Covered			Topic	No of Weeks	Contact hours	1. History of Genetics	1	1	2. The Cell	1	1	3. Cytogenetics (Chromosomes)	1	1	4. DNA structure and function	1	1	5. Mutation	1	1	6. Mutation detection techniques	1	1	7. PCR	1	1	8. Cloning	1	1	9. Population Genetics	1	1	10. Clinical Genetics and Genetic disorders	1	1	11. Chromosomal Disorders	1	1	12. Sickle Cell Anaemia & Thalassemia	1	1
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Examination:	<i>First and second midterm examinations (40%), Final practical examination (20%) and Final theory examination (40%)</i>																																											