Detailed course appendix

IMR111: Basic Immunology:

This course helps the student to know all the components of the immune system and their functions, understand the interrelationship between these elements and be able to analyze their role both in normal and imbalanced immune response.

IMR112: Major Histocompatibility Complex (MHC)

After this course, the student should know the genetic basis of MHC, the structure of the Human Leucocyte Antigen (HLA) proteins and its differential expression on the surface of nucleated cells, understand the function of MHC in normal immune response and in transplantation, be able to analyze the theories of HLA association with certain diseases, and be able to apply different methods of HLA typing.

IMR 113: Molecular Biology

Molecular biology pertains to the study of living systems at the molecular level, especially DNA and RNA, and provides a background appropriate for further work in the rapidly expanding areas of genomics, cell biology, biotechnology, microbiology, diagnostics, and therapeutics. This module will focus on selected aspects of molecular biology that provide the students with the principles for understanding the structure and functional relationships of molecular biology techniques including DNA manipulation, sequencing, cloning, subcloning, library construction, screening, RNA isolation and characterization, analysis of expression, cDNA synthesis (RT-PCR) and analysis, microarrays and gene chips, and Real-Time-PCR. Multiple modern day molecular biology techniques in the biotechnology and pharmaceutical industries will be presented and several examples of molecular applications will be highlighted.

IMR 114: Immuno-Pharmacology

The course will introduce the basic principles of pharmacology to the student with appropriate understanding of essentials of drug-body and body-drug interactions with particular focus on immunopharmacology and drugs affecting the immune system. Students will be able to design treatment protocols and select drugs with high efficacy and accuracy.

IMR 115: Ethics in medicine and scientific research

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IMR 115: Ethics in medicine and scientific research

This course provides basic Ethics related to Regenerative Medicine and Stem Cells, the students must be able to identify the ethical values and legal regulations concerning this new field.

IMR 116: Lab safety

This module deals with safety guidelines and procedures for working with biohazardous materials, recombinant DNA molecules and Bloodborne Pathogens.

Content will also include lab policies, responsibilities and requirements for

research involving the use of biological materials. This module helps to safe lab practices to minimize the risk of spills and chemical or biological exposures. Laboratories involve many chemicals, procedures, and operations that require specific safety precautions.

IMR117: Care and use of experimental animals

This course will introduce the student to the ethics and rules of handling of different types and species of experimental animals. As will as the proper selection of the experimental animals according to the research type and research objectives. The students will also learn the different routes of drug administration to the animals

IMR118: Haematopoiesis:

This course helps the student to know the origin of all blood cells, understand the normal development of these cells under different growth factors and be able to recognize the morphology of the different developmental stages of the blood cells

Semester II:

IMR121: Advanced Immunology:

Advanced immunology is a course in which fundamental immunology concepts are both reinforced and extended through the study of human diseases of the immune system. The role of the immune system in human health and disease is described in detail, with examples showing how the immune dysfunction leads to chronic inflammatory diseases such as rheumatoid arthritis (autoimmune diseases) and asthma (hypersensitivity),

cancer immunology, immunogenetics and immune deficiency. Throughout the course students will also learn about Applied Immunology, with focusing on transplantation immunology, vaccine technology and immunotherapeutics. Problem-based learning exercises will be used to demonstrate these topics. Analyze the medical literature reporting immunologic advances pertinent to their patients,

cite the rationale for use of new immunodiagnostic and immunotherapeutic modalities in their patients, and to serve as thought leaders within their medical community. 5

IMR122: Immunochemistry

This course focuses on the chemistry of cellular and molecular immunology. By the end of the course, the students will acquire advanced theoretical background on the chemical structure of immune system e.g. antibodies, immunoglobulin ect….

IMR 123: Stem Cells

The module entitled stem cells is a tool to acquire knowledge about the different types of stem cells with special emphasis on their functions and therapeutic applications..

The students will be asked to be interactive formulating questions and creative ideas for the future.

IMR 124: Biostatistics

This course introduces the basis for development and application of statistical reasoning and methods in addressing, analyzing and solving problems related to health and biomedical research.

IMR 125: Infection control

This module is composed of three credit hours to be delivered through three successive weeks (one lecture per week).The course is designed for Master post graduate students , who have background of general immunology and medical microbiology. The module provides students with a detailed description on prevention and control of infectious diseases. .It covers a full description of the different modes of transmission of infection, different types of communicable diseases, different types of general and specific prevention and how to control the spread of diseases. .In addition, the module covers in details the ISO specifications required for prevention of infection in hospital wards, surgical wards, dental and some other clinics as well as some selected collections or units in the community

In addition, . The module includes different methods of sterilization with a special reference to advanced methods of sterilization as well as a review on sterility tests..

Module sequences will be supplemented with several power points (5) ,PDF texts(5) and more than three videos related to the subject. Module will also include 5 pretest questions and 10 MCQ post test. In addition, at least one challenge question will be given through each sequence.

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IMR 126: Bioinformatics

Bioinformatics is an integration of mathematical, statistical and computational methods to analyze biological, biochemical and biophysical data. It deals with methods of storing, retrieving and analyzing biological data, such as nucleic acid and protein sequences, structures, functions, pathways and genetic interactions.

Bioinformatics include the use of computer in solving information problems in life sciences; mainly it involves the creation of extensive electronic database on genomes and protein sequences. Secondarily it involves techniques such as the three-dimensional modeling of bimolecular and biological systems 6

127: Pharmaceutical chemistry and molecular modeling (Immunochemistry II)

The students will be able to examine the chemical mechanism used by the immune system to recognize antigen and the chemical activation of the immune system that results from antigen recognition. The students will be able to describe the means by which the stimulated immune system eliminates foreign molecules, cells and organs.

Semester 3:

IMR131: Organ &Tissue Replacement:

Restoration of functional as well as anatomical integrity of badly diseased vital organs and extensively damaged tissues, represents clinical dilemma. course provides basic considerations of solid organ replacement , and updates clinical employment of Stem Cells for the management of tissue damage in general, with special emphasis on urogenital tissue regeneration ..

IMR132: Cell therapy:

This course describes the indications of cell therapy in different diseases together with its limitations. It also entitles the possible complications of such therapy.

IMR 132: Advanced techniques in stem cells:

This course helps the student to understand and know updated techniques used in isolation of stem cells from bone marrow and cord blood mainly plastic adherence, density gradient and specific CD markers. In addition it highlights different cultures and differentiation protocols.

IMR 134: Immunomodulation:

This module is composed of three credit hours to be delivered through three successive weeks (one lecture per week). The course is designed for Master post graduate students, who have background of general immunology and medical microbiology. The module provides students with a detailed description on I immunomodulation subject .It covers a full description of the different types of immunomodulation including immunosuppressive drugs, specific and non specific immunostimulators with their groups and mechanism of action .In addition, the module covers immunotolerance, tolerogens as well as information comprising new advances in immunomodulation and immunotherapy. Module sequences will be supplemented with several power points (8), PDF texts(5) and more than three videos related to the subject. Module will also include 5 pretest questions and 10 MCQ post test. In addition, at least one challenge question will be given through each sequence.

Semester 4:

IMR 141: Graduation project

A final research project is required of all students to be prepared, discussed and defended after a laboratory work in the students' home institution in order to validate this course. Laboratories could be for research, analysis or industries, whatever could be acquired by the student. The thesis topic is the research project designed in the first semester. This course is completely practical in nature (6 months local training course).

IMR142: Practical training program:

The students should complete practical training course to fulfil the requirements for program graduation. The training course involves:

1. Stem cells isolation, culture and preservation
2. Molecular biology techniques including, PCR, RT PCR, cloning and cell culture techniques
3. Flow cytometry
4. Statistical analysis