



TEHRAN UNIVERSITY
OF
MEDICAL SCIENCES

School of Allied Medical Sciences

Course Description Guide

Master of Science in Infection Prevention and Control

In the Name of God

Section I:

Title: Infection Prevention and Control

Degree: Master of Science

Introduction:

Preventing and controlling the spread of infection is one of the key priorities for hospital staff, environmental health officers and healthcare professionals throughout the world. The M.Sc. Infection Prevention and Control has been designed for all health professionals who have an infection control role in their workplace but is open to anyone with an interest in this area. The knowledge and understanding of infection control practice, giving them the ability to develop and implement strategies to reduce the spread of hospital acquired infection and respond appropriately to an outbreak of infection within a community.

Definition:

Master of Science in Infection Prevention and Control is one of the medical sciences educational programs, during which students become familiar with hospital environment, nosocomial infection classification and infection prevention principles.

Familiarity with isolation requirements, sterilization and disinfection methods to be applied in medical applications.

The Aim of the Course:

The mission of this program is to train individuals who can provide controlling of healthcare associated infections in patients, visitors, and staff. The vision of the program is focused on the enhancement of care standards in the hospitals, clinics and health care centers and improvement of educational and research standards in the field of Infection Prevention and Control in order to improve skills, capability and talents in individuals.

General Competencies: General Expected Competencies

- Communication skills
- Education
- Statistical calculations
- Research and scientific article publication
- Critical thinking and problem-solving skills
- Professionalism

Terms and Conditions of Admission to the Course

- A. Holding a BSc degree in** Medical Laboratory Sciences, Microbiology, Anesthesia Techniques, Operating Room Technology, Nursing.
- B. Submitting a CV**

Educational Strategies, Methods and Techniques

- Theoretical
- Practical

Educational Strategies, Methods and Techniques

Student Assessment

- Examination
- Seminar

Number and Type of Credits and Tables of the Courses

Types of Courses and Number of Credits

Obligatory, Special Courses (CORE)	23 Credits
Optional Courses	3 Credits
Thesis	6 Credits
Total	32 Credits

Table A. Compensatory Courses in Discontinuous Master's Program in Infection Prevention and Control

Row	Title	No. of Credits	Course Hours			Prerequisite
			Theoretical	Practical	Total	
01	Mycology and Parasitology	2	34	-	34	-
02	Environmental Health	2	34	-	34	-
03	Information Technology	1	9	17	26	-
04	Basic Bacteriology	3	51	-	51	-
05	Basic Immunology	1	17	-	17	-
06	Biostatistics	2	34	-	34	-
07	Research Methods	2	34	-	34	-
08	Virology	1	17	-	17	-

Table B. Obligatory, Special Courses (Core) in Discontinuous Master's Program in Infection Prevention and Control

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
09	Basic epidemiology	2	34	-	34	-
10	Medical Bacteriology	3	34	34	68	
11	Infectious Diseases	2	34	-	34	Medical Bacteriology
12	Pharmacology	1	17	-	17	Immunology
13	Principles of Nosocomial Infection Prevention	2	34	-	34	Medical Bacteriology
14	Principles of Sterilization and Disinfection Materials	1	17	-	17	-
15	Clinical Epidemiology	2	34	-	34	Basic epidemiology
16	Occupational Health	2	25	17	42	-
17	Antibiotic Resistance	2	26	17	43	Medical Bacteriology
18	Immunology	1	26	-	26	-
19	Principles of Safety in Laboratory	1	17	-	17	-
20	Internship	3	-	153	153	-
21	Seminar	1	-	-	-	-
22	Thesis	6	-	-	-	-
Total		27				

Table C. Optional Courses in Discontinuous Master's Program in Infection Prevention and Control

Course Code	Title	No. of	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
23	Cellular & Molecular Biology	2	34	-	34	-
24	Quality Control in Laboratory	1	17	-	17	-
25	Health Economics	1	17	-	17	-
26	Health Information System	2	34	-	34	-
Total		6				

* Students should pass only 5 out of 6 from optional courses.

Ethical issues

The graduates should,

- Observe the Patient's Bill of Rights¹ when working with the patients.
- Strictly observe Biosafety and Patient Safety Rules* concerning the patients, personnel and workplace.
- Observe the Rulebook for Dress Code².
- Strictly observe the Regulations of Working with the Laboratory Animals³.
- Carefully preserve resources and equipment.
- Truly respect faculty members, the staff, classmates and other students and work for creating an intimate and respectful atmosphere.
- Observe social and professional ethical considerations in criticism.

1, 2 and 3 are contained in the Enclosures.

*Biosafety and Patient Safety Rules will be set out by the Educational Departments and will be available to the students.

Section II

Title of the Course: Mycology and Parasitology

Code of the course: 01

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Upon successful completion of this course, the student should be able to:

- Use an understanding of medical mycology and parasitology to make appropriate and effective on-the-job professional decisions.
- Apply parasitology/mycology laboratory techniques, methodologies, instruments and equipment; and accurately identify, record, and report results to improve patient care.
- Adapt parasitology and mycology laboratory techniques/procedures when errors and discrepancies in results are obtained to effect resolution in a professional and timely manner.

Course description:

The course aims to give in depth knowledge about infectious diseases and pathogens of animals as well as broad knowledge of disease mechanisms at the level of organism and cells, particularly at the level of interactions between pathogens and the immune system. Relevant examples where the knowledge is important for animal health, achievements and food production are discussed. Diagnosis of infections, routes of infections, detection and isolation of pathogens are discussed and demonstrated.

Main topics: 34 hours:

1. Protozoology:
Flagellates (trichomonas / Giardia / Kylomastics / Entamoeba / Trypanosomes – leishmanial / Amoeba plasmodium types / Cryptosporidium / Isospora / Toxoplasma / Sarcocystis / Cyclospora / Pneumocystis hominis
2. General entomology:
Sand fly / Anopheles / Scabies (itch) / Flea / bedbug (galliniper) / Ticks / louse (cootie)
3. General Parasitology / Division Parasites / General heminthology
4. Ascaris / visceral larva migrans / oxyuris / trichocephal / hook worms / cutaneous larva migrans / strongyloides stercoralis / trichostrongylus / ginea worm / capillaria hepatica and phylipinesys trichina / microfilaris
5. Cestodes:
Tacia saginata / Taenia echinococcus / Hymenolyps nana
6. Trematodes:
General Trematodes / Fasiola / Dicrocoelium / Schistosoma hematobium

7. General Mycology:
Formation of fungus / Cell structure and their classification / How Sexual – asexual – pseudo sexual reproduction
8. Recipes and nutritional requirements and essential elements for the growth of fungi
9. Introduction to the macroscopic properties of saprophytic fungi
10. Description of superficial fungal diseases
11. Description of subcutaneous fungal diseases {symptoms (clinical signs) / causes / treatment laboratory diagnostics}
12. The method of sample from patient's body and body fluids – Homogenization and doping samples method and how to transport them
13. How to maintain fungal cultures and its slides in the short term and long term and fight with mite

Theoretical 2 units (34 hours)

Principal reference(s):

- 1) Basic Clinical Parasitology by/ Brown. Latest ed.
- 2) Worms and Human disease by/ Muller. Latest ed.
- 3) Medical Parasitology by/ Markell. Latest ed.
- 4) Medical Mycology, Rippon, Latest ed.
- 5) Medical Mycology, Evans, Latest ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Environmental Health

Code of the course: 02

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Upon completion of this course, the student will be able to:

- Define the major sources and types of environmental agents.
- Discuss the transport and fate of these agents in the environment.
- Identify the carriers or vectors that promote the transfer of these agents from the environment to the human.
- Describe how these agents interact with biological systems, and the mechanisms by which they exert adverse health effects.
- Explain and use models for prediction of the magnitude of adverse effects in biological systems.
- Identify and define the steps in the risk-assessment and risk-management processes.
- Describe the steps in the regulatory process in terms of risk assessment and risk management and identify current legislation and regulation regarding environmental issues.
- Identify significant gaps in the current knowledge base concerning the health effects of environmental agents and identify areas of uncertainty in the risk-assessment process.

Course description:

Examines health issues, scientific understanding of causes, and possible future approaches to control of the major environmental health problems in industrialized and developing countries. Topics include how the body reacts to environmental pollutants; physical, chemical, and biological agents of environmental contamination; vectors for dissemination (air, water, soil); solid and hazardous waste; susceptible populations; biomarkers and risk analysis; the scientific basis for policy decisions; and emerging global environmental health problems.

Main topics: 34 hours:

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Theoretical 2 units (34 hours)

Principal reference(s):

- 1) Environmental Engineering, Salvato. J.A, latest ed.
- 2) Handbook of Solid Waste Management, George Tchobanoglous, Frank Kreith, latest ed.

- 3) Air pollution: Measurement, Modling and Mitigation, Abhishek Tiwary, Jeremy colls, latest ed.
- 4) Industrial Water Pollution Control, Eckenfelder, latest ed
- 5) Wastewater Engineering, Metcalf & Eddy, latest ed
- 6) Water Quality and Treatment, AWWA, latest ed
- 7) Fluid Mechanics, Streeter and wylie, latest ed
- 8) Wastewater Microbiology, Gabriel Bitton, latest ed
- 9) Microbiology of Drinking Water Production and Distribution, Gabriel Bitton, latest ed
- 10) Chemistry for Environmental Engineering and Science, Sawyer & Mccarty, latest ed

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Information Technology

Code of the course: 03

Number of Credits: 1

Type of the course: Theoretical /Practical

Prerequisite: None

Principal objective(s) of the course:

Students will also gain some hands-on exposure to powerful, high-level tools for making computers do amazing things, without the need for conventional programming languages.

Course description:

Information Technology helps students understand technical concepts underlying current and future developments in information technology. There will be a special emphasis on networks and distributed computing.

Main topics: 26 hours:

1. The history of IT / Computational logic in computer / the main constituents (Hardware and software) / Types of memory / units of measurement memory / the concept (meaning) of system boot / necessary files to boot
2. The concept of operating system / variety of operating system / file management in operating system / file management in DOS operating system
3. Windows operating system / file management in windows operating system / hardware in operating system / the concept of setting up drivers / windows operating system's settings
4. Public profile program / view files / applications / menus / structured text / principles of writing in MS word / principle of design tables in MS word / using special tools / settings in MS word
5. Principles of presentation designing / power point's settings special tools in power point
6. Network / network concept / a variety of network / the concept of data protocols / a variety of data transfer protocols / TCP-IP protocols / the definition of IP / application of IP / levels of access and network security / initial orders on the net
7. Meaning of domain and work group / transfer and sharing of hardware and software in the network / message transmission in network
8. Sources of information on the internet / a variety of internet browser programs / transmission of information on the internet / searching in internet / search engines / a variety of search engines and search principle
9. Calculations and operations in excel / the chart in excel / setting in excel
10. Proprietary tools in the form of data entry / forms of fusion tables in access

Theoretical 0.5 units (9 hours)

Practical 0.5 units (17 hours)

Principal reference(s):

- 1) Essentials of health information management principles& practices, Michelle A. Green, Mary Jo Bowe. Delmar. Last ed.
- 2) Health information management: concepts, principles, Kathleen M. LaTour .AHIMA. Last ed.
- 3) Health care information systems: a practical approach for health care management, Karen A. Wager, Frances Wickham Lee, John P. Glaser, Last ed

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Basic Bacteriology

Code of the course: 04

Number of Credits: 3

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Designed to provide students with a clear entry to mid-level understanding of the clinical and diagnostic issues in bacteriology, the course should be used as an introduction to more advanced study in infectious diseases and clinical microbiology.

Course description:

The course begins with introductory lectures reviewing the laboratory methods in use in modern diagnostic laboratories. Following this, each of the major bacterial pathogens affecting humans is reviewed in a two hour lecture. At each lecture the taxonomy, structure, epidemiology, virulence factors, clinical presentations of infection, diagnosis and detection, treatment and prevention are discussed for each. A separate series of lectures discusses also the role and mechanisms of common antimicrobial resistance in bacteria. For each lecture, students will also be responsible for the provided handouts as potential exam material.

Main topics: 51 hours:

1. The classification of microbes
2. Bacterial cell building
3. Nutrition and growth of bacteria
4. Genetics of Microorganisms
5. Microbial ecology and Microflora of various body parts
6. Antimicrobial agents (physical, chemical, pharmaceutical)
7. Bacterial infections (associated microbial host, the virulence and precipitating factors, bacterial toxins and their mechanism of action)

Theoretical 3 units (51 hours):

Principal reference(s):

1. Microbiology, Jawetz & et al, last ed.
2. Microbiology, Murray, last ed.
3. Diagnostic Microbiology, Sydney M. Finegold (Baily & Scott), last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Basic Immunology

Code of the course: 05

Number of Credits: 1

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Successful students will:

- Communicate effectively in oral and written formats using appropriate vocabulary regarding the immunological response, mechanisms of this response, its regulation and the genetic basis.
- Apply scientific principles in the interpretation of immunological responses and data.
- Apply an understanding of the roles of immunology in protection against disease and autoimmune disorders to choices in their daily lives.

Course description:

Introduces the principles of immunology including: development of the immune system, innate immunity, immunoglobulin structure and genetics, antigen-antibody reactions, the major histocompatibility complex reactions and antigen presentation, T cell receptors (genetics, structure, selection), T cell activation and effector functions, anergy and apoptosis, cytokines, phagocytic cell function, immune responses to infectious organisms and tumors, autoimmune diseases, autoimmunity, allergies, and immune deficiencies.

Main topics: 17 hours:

1. Immunoglobulines
2. Antigens
3. Cells and member of immune system
4. B-lymphocyte and differentiation of B-lymphocyte / Glasmith and immunoglobulines synthesis
5. Production of antibody and the theory related to the production of antibody – different phases of the production of antibodies in the primary and secondary immune responses
6. The complement system
7. Natural immunity (Non- Proprietary)
8. Acts of macrophages and granulocytes / NK and Cytotoxic cell / Antigen Presenting cells
9. The reaction between antigen and antibody

Theoretical 1 unit (17 hours)

Principal reference(s):

1. Abul K. Abbas. Cellular and Molecular Immunology, Latest Ed.
2. Immunology (Roitt), Latest Ed.
3. Medical Immunology, Stites et al, last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Biostatistics

Code of the course: 06

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Upon completion of the course, students are able to:

- Recognize and give examples of different types of data arising in public health and clinical studies
- Interpret differences in data distributions via visual displays
- Calculate standard normal scores and resulting probabilities
- Calculate and interpret confidence intervals for population means and proportions
- Interpret and explain a p-value
- Select an appropriate test for comparing two populations on a continuous measure, when the two sample t-test is not appropriate
- Understand and interpret results from Analysis of Variance (ANOVA), a technique used to compare means amongst more than two independent populations
- Understand and interpret relative risks and odds ratios when comparing two populations
- Understand why survival (timed to event) data requires its own type of analysis techniques
- Construct a Kaplan-Meier estimate of the survival function that describes the "survival experience" of a cohort of subjects
- Interpret the result of a log-rank test in the context of comparing the "survival experience" of multiple cohorts

Course description:

It provides an introduction to selected important topics in biostatistical concepts and reasoning. This course represents an introduction to the field and provides a survey of data and data types. Specific topics include tools for describing central tendency and variability in data; methods for performing inference on population means and proportions via sample data; statistical hypothesis testing and its application to group comparisons; issues of power and sample size in study designs; and random sample and other study types. While there are some formulae and computational elements to the course, the emphasis is on interpretation and concepts.

Main topics: 34 hours:

1. One sided (one way) variance analysis (over one trait grouping)
 - Independent sample and completely randomized experiments
 - Population mean (average) equality test
 - Simple and multiple comparison (analogy)
2. Two sided variance analysis (over two trait grouping)
 - Grouping compared to the same trait (completely randomized blocks)
 - Grouping of the two traits with repeated (factorial experiment)
3. Correlation and regression between the two traits
 - Linear correlation
 - Linear regression
4. Common application X² testing
 - Compliance test sample with a theoretical distribution
 - Homogeneity test primarily deal
 - Fisher's exact test
 - McNemar's test
5. a simple non-parametric test
6. standardized indicator and test(ing) them

Theoretical 2 units (34 hours)**Principal reference(s):**

1. Statistical Methods in Medical Research Armitage & Bory; Blackwell, 2002, 4th Ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Research Methods

Code of the course: 07

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Increasing the level of knowledge of students in the field of medical sciences research methods. At the end of this course students should prepare a proposal which includes identify a problem, working on research paper, objectives, etc.

Course description:

In this course students would get knowledge about different methods of research in the field of medical and health sciences.

Main topics: 34 hours:

1. Importance and types of research in medical sciences
2. Research subject selection and expression issue
3. How to evaluate texts
4. Objectives / questions and hypotheses
5. Study methods
6. Defined variables and their types
7. The method of collecting research data (including inventory)
8. Biopsy (sampling) procedures
9. Plan of pilot / Staff estimates / The budget / Set the empty tables / Project management research
10. Analysis of data using statistical methods
11. Research ethics

Theoretical 2 units (34 hours)

Principal reference(s):

- 1) Lumley J. S.P. Benjamin W. *Some Ground Rules* Oxford University Press. Oxford. Last edition
- 2) Abedsaedi Zilla and Amir, Aliakbari Sedeghe, *Research Method in Medical Sciences*, Last edition.
- 3) Asefzadeh Saied, Mallek afzali Hosien. *Ten Steps in Research of the Health and Treatment Systems*, Tehran, Health, treatment and Medical educations Ministry, Last edition

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Virology

Code of the course: 08

Number of Credits: 1

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

The aim of the virology practical course is to demonstrate the routine processes used in veterinary virology diagnostics. Students will perform different diagnostic tests during the course. Diagnostic samples will be processed to detect the causative agent from the samples and to establish the diagnosis of the different cases. The program will be the following:

- practical: sample processing, inoculation of sample into cell culture and embryonated egg
- practical: investigation of the infected cell cultures, cytopathic effects (CPEs), haemagglutination test
- practical: nucleic acid investigation, polymerase chain reaction (PCR)
- practical: evaluation of the PCR, preparation of virus neutralization test
- practical: evaluation of virus neutralization test, haemagglutination inhibition test (HAI), discussion of results and diagnosis

Course description:

Get an introduction to modern medical virology, with an emphasis on structure, molecular biology, viral replication, mutations, and evolution of viruses, host cell interactions and pathogenesis, as well as diagnosis, control and prevention of infection.

Main topics: 17 hours:

1. Introduction and history of virology
2. General characteristics of viruses / structure and composition and classification of viruses
3. Virus replication with cancers/ tumorigenic viruses
4. Antiviral compounds (Antiviral drugs- interferons)
5. Description of DNA-viruses and RNA-viruses
6. Transmission in medical centers and prevent transmission methods

Theoretical 1 unit (17 hours)

Principal reference(s):

1. Medical Microbiology (Jawetz et al). Latest ed.
2. Medical Microbiology (Murray et al). Latest ed.
3. Medical Microbiology (Zinsser), last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Basic Epidemiology

Code of the course: 09

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: none

Principal objective(s) of the course:

To become familiar with epidemiologic terminology, outcome measures, and study designs; to appreciate application of epidemiology to subfields (e.g., infectious diseases, reproductive health, genetics); and to apply epidemiologic methods to current public health issues.

Course description:

This course introduces the basic principles and methods of epidemiology, with an emphasis on critical thinking, analytic skills, and application to clinical practice and research. Topics include outcome measures, methods of adjustment, surveillance, quantitative study designs, and sources of data. Designed for those with a clinical background, the course will provide tools for critically evaluating the literature and skills to practice evidence-based medicine.

Main topics: (17 hours)

1. The definition of epidemiology / disease concepts and models in epidemiology
2. Regulations for the prevention of communicable diseases
3. Control and prevention measures
4. Standards and prevention measures
5. The risk carriers of infectious agents –vaccination
6. The role of the laboratory in the fight against infectious diseases and epidemics
7. Vaccines / vaccination and health programs
8. Types of vaccines
9. Control of infectious and contagious diseases
10. Hospital infections
11. General human ecology
12. Types of epidemiological studies
13. Epidemiology of healthcare-associated infections
14. Molecular methods in healthcare epidemiology
15. Infection control and use of evidence-based medicine
16. Investigating endemic and epidemic healthcare-associated infections
17. Epidemiological methods for investigating infections in healthcare settings

18. Economic evaluation of healthcare-associated infections and infection control Interventions
19. The development of infection surveillance and control programs
20. Surveillance of healthcare-associated infections
21. The potential of telemedicine for hospital epidemiology

Theoretical 1 unit (17 hours)

Principal reference(s):

- 1- *Medical Epidemiology* (Greenberg) Latest ed.
- 2- *Epidemiology* (Leon Gordis) Latest ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Medical Bacteriology

Code of the course: 10

Number of Credits: 3

Type of the course: Theoretical/ Practical

Principal objective(s) of the course:

The goals of the course are for students to gain a knowledge and understanding of:

1. Microbial diagnosis (sensitivity, and limitations of clinical diagnostic tests).
2. Etiology (infectious agents responsible, differential diagnoses – infectious or not).
3. Epidemiology (transmission, susceptibility, patterns).
4. Pathogenesis (how the organisms cause disease).
5. Compare and contrast different microbial diseases, including the properties of different types of pathogens, and the mechanisms of pathogenesis.

Course description:

Gain familiarity with important microbial pathogens, including bacteria, viruses, fungi and parasites. You then study their biological characteristics, epidemiology, mechanisms and routes of transmission, pathogenesis and immunity, host response, control and prevention

Main topics: (68 hours)

1. Micrococaceae Family(Staphylococcus, Micrococcus and similar organisms)
2. Streptococaceae Family 1 (Beta Hemolytic Streptococcus, groups A, B, C and D and similar organisms)
3. Streptococaceae Family 2 (Enterococcus, Viridance Streptococcus, Non hemolytic Streptococcus & Pneumococcus)
4. Gram positive bacillus family with spores(Chelostidium, Bacillus)
5. Gram positive bacillus family without spores(Chorynebacterium, Listeria, Erysipelothrix & Rothia)
6. Enterobacteriaceae family (E.coli, Shigella, Salmonella, Proteus, Providencea,.....)
7. Neisseriaceae family(Neisseria meningitidis, Neisseria gonorrhoeae, Branhamella)
8. Mycobacterium family(Mycobacterium tuberculosis, Mycobacterium leprea)
9. Spirochetes form of bacteria(Treponema, Borellia, Leptospira)
10. Non fermenter gram negative Bacteria(Pseudomonas, Alkaligenes,)
11. Vibrio, Aeromonas, Plesimonas
12. Gram negative Cocobacilli family(Heamophylus, Brucella, Bordetella, Francisella)
13. Obligate Intracellular and Nonculturable Bacterial Agents(Chlamydia, Rickettsia)
14. Campylobacter and Helicobacter

15. Anaerobic Bacteria Family
16. Actinomyses and Streptomyses
17. Detection and identification of Micrococaceae Family (Staphylococcus, Micrococcus, Planococcus, Stomatococcus) with specific tests. Nail culture for detection of Staphylococcus aureus carriers.
18. Analysis results of the Cultures and view slides prepared
19. Detection and Identification of Beta Hemolytic Streptococcus includes Streptococcus groups A, B, C and D. throat culture for detection of streptococcus group A carriers.
20. Analysis results of the Cultures and view slides prepared
21. Detection and Identification of Viridance Streptococcus, Non hemolytic Streptococcus & Pneumococcus by specific tests.
22. Analysis results of the Cultures and view slides prepared
23. The survey of detection methods for Gram positive bacillus family with spores includes Chelostidium and Bacillus and demonstration the slides. Doing the malachite green and muller staining for observing of spores.
24. Analysis results of the Cultures and view slides prepared
25. The survey of detection methods for Gram positive bacillus family without spores includes Chorynebacterium, Listeria and demonstration the slides. Doing the albert staining for observing the metachromatic granules in bacteria.
26. Analysis results of the Cultures and view slides prepared
27. Detection and Identification of lactose non fermenter enterobacteriaceae family include Shigella, Salmonella, and Proteus..... and Doing IMVIC tests.
28. Analysis results of the Cultures and view slides prepared
29. Detection and Identification of lactose fermenter enterobacteriaceae family include E.coli and Doing IMVIC tests.
30. Analysis results of the Cultures and view slides prepared
31. Detection and Identification of Neisseria meningitidis, Neisseria gonorrhoeae with sugar utilization methods.
32. Analysis results of the Cultures and view slides prepared. Observing the Neisseria gonorrhoeae in vaginal discharge smears.
33. Nocardia, Streptomyces, Rhodococcus and similar Organisms
34. Acinetobacter, Stenotrophomonas and Similar Organisms
35. Moraxella, Eikenella and Related Organisms
36. Actinobacillus, Aggregatibacter, Kingella, Cardiobacterium, Capnocytophaga and Similar Organisms
37. Bartonella , Afipia and Arcobacter
38. Legionella
39. Streptobacillus moniliformis and Spirillum minus
40. Overview of Anaerobic Organisms

41. Nontuberculous Mycobacteria
42. Obligate Intracellular and Nonculturable Bacterial Agents(Orientia, Anaplasma, Ehrlichia, Coxiella and Tropheryma whipplei)
43. Cell Wall Deficient Bacteria: Mycoplasma and Ureaplasma
44. Spirochete(Leptospira, Brachyspira)
45. The survey of detection methods for Mycobacterium tuberculosis. Sputum culture and doing the Ziel-Nelson staining. Observing the gardenella vaginalis in vaginal discharge smears.
46. Analysis results of the Cultures and view slides prepared
47. The survey of detection methods for Treponema, Borrelia and Leptospira and chlamidia.
48. Analysis results of the Cultures and view slides prepared
49. Detection and Identification of Non fermenter gram negative Bacteria include Pseudomonas, Alcaligenes and Acinetobacter with specific pathways.
50. Analysis results of the Cultures and view slides prepared
51. The survey of detection methods for Gram negative Cocobacilli include Hemophilus, Brucella, legionella
52. Analysis results of the Cultures and view slides prepared
53. Detection and Identification of Non fermenter gram negative Bacteria include Pseudomonas, Alcaligenes and Acinetobacter with specific pathways.
54. Analysis results of the Cultures and view slides prepared
55. The survey of detection methods for anaerobic bacteria. Doing urine culture and Antibiotic susceptibility test and interpretation of results.
56. Analysis results of the Cultures and view slides prepared
57. Doing the Stool culture and Antibiotic susceptibility test and interpretation of results.
58. Analysis results of the Cultures and view slides prepared

Theoretical 2 unit (34 hours)

Practical 1 unit (34 hours)

Principal reference(s):

Microbiology, Jawetz & et al, last ed.

Microbiology, Murray, last ed.

Diagnostic Microbiology, Sydney M. Finegold (Baily & Scott), last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Infectious Diseases

Code of the course: 11

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: Medical Bacteriology

Principal objective(s) of the course:

Understanding of prevention and control of infectious disease.

Course description:

This course will survey a wide range of human pathogens and relate their emergence to themes based on environmental, human, and microbiological factors. Specific organisms will be studied in depth to illustrate microbial threats as well as epidemiological investigations, pathogenicity research, vaccine development, and other strategies deployed to control disease emergence and spread. Although microbiology features prominently, the human element remains the cornerstone of our struggle against infectious disease.

Main topics: 34 hours:

1. Epidemiology of healthcare-associated infections
2. Hospital-acquired pneumonia
3. Infections due to infusion therapy (Catheter-associated bloodstream infection)
4. Surgical site infections
5. Catheter-associated urinary tract infections
6. Infections in skeletal prostheses
7. Central nervous system infections
8. Infectious gastroenteritis including *c. difficile*
9. Blood borne pathogens
10. Healthcare-associated respiratory viral infections
11. Healthcare-associated sinusitis
12. Healthcare-associated ocular infections
13. Healthcare-associated infections in dental, oral and maxillofacial surgery
14. Healthcare-associated infections in obstetric patients
15. Healthcare-associated infections in anesthesia
16. Healthcare-associated infections in endoscopy
17. Infections associated with physical therapy, including hydrotherapy, and respiratory therapy
18. Healthcare-associated infections in radiology
19. Infections of implantable cardiac and vascular devices
20. Infection in transplant recipients
21. Healthcare-associated fungal infections
22. Infections associated with hyperbaric oxygen therapy and hyperbaric chambers
23. Infections of burn wounds

24. Tuberculosis
25. Recognizing and managing biologic terror (anthrax, ...)
26. Prion diseases

Theoretical 2 units (34 hours)

Principal reference(s):

Book:

1. Bennett and Brachman's Hospital Infection. William R. Jarvis. 6th ed. Philadelphia , Wolters Kluwer/Lippincott Williams & Wilkins, 2014.
2. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 8th ed. Philadelphia, Elsevier Saunders, 2015.
3. Hospital Epidemiology and Infection Control. C. Glen Mayhall. 4th ed. Philadelphia , Wolters Kluwer/ Lippincott Williams & Wilkins, 2012.

Guidelines:

1. www.idsociety.org : IDSA guidelines
2. www.CDC.gov: CDC guidelines
3. www.who.int: WHO guidelines
4. www.shea-online.org: SHEA guidelines
5. www.osha.gov: OSHA guidelines

Journals:

1. American Journal of infection control
2. The journal of hospital infection
3. Journal of infection control and hospital epidemiology
4. Journal of clinical epidemiology

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Pharmacology

Code of the course: 12

Number of Credits: 1

Type of the course: Theoretical

Prerequisite: Immunology

Principal objective(s) of the course:

To become familiar with function of drug inside the body.

Course description:

This course introduces the study of the properties, effects, and therapeutic value of the primary agents in the major drug categories. Topics include nutritional products, blood modifiers, hormones, diuretics, cardiovascular agents, respiratory drugs, and gastrointestinal agents. Upon completion, students should be able to place major drugs into correct therapeutic categories and identify indications, side effects, and trade and generic names.

Main topics: 17 hours

1. General pharmacodynamics / Pharmacokinetics / absorption / release / metabolism and half – life of drugs
2. Effective drugs against disease – causing agents live like: Anti-fungal, Anti-parasitic and Anti-viral drugs
3. Adreno corticosteroids
4. Antibiotics interfere with other medications

Theoretical 1 unit (17 hours)

Principal reference(s):

Basic and clinical Pharmacology, Katzung, last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Principles of Nosocomial Infection Prevention

Code of the course: 13

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: Medical Bacteriology

Principal objective(s) of the course:

Students who complete the course will have gained knowledge in:

- The fundamental principles Standard Precautions, isolation requirements and appropriate barrier protection;
- Recognition of common communicable diseases and their management;
- The approach to outbreak identification, investigation and management;

Course description:

It introduces students to the principles of infection prevention and control, outbreak investigation and management, and surveillance techniques as well as other topics pertinent to long-term care, pediatric and community infection control.

The case topics include (but are not limited to): Isolation and barrier precautions, surveillance of nosocomial infections, infection control precautions, outbreak investigation, antibiotic resistance, common communicable diseases (e.g. tuberculosis, influenza), pediatric issues in infection control as well as the unique perspectives of long-term and ambulatory care.

Main topics: 34 hours

1. Epidemiology of healthcare-associated infections
2. The expanded role of the nurse in hospital epidemiology
3. Hand hygiene and improving compliance with hand hygiene
4. Personnel health services (vaccination programs, occupational exposure, ...)
5. The development of infection surveillance and control programs
6. Surveillance of healthcare-associated infections
7. The role of the laboratory in control of healthcare-associated infections
8. Isolation precautions
9. Design and maintenance of hospital ventilation systems
10. The inanimate environment and disinfection
11. Central service supply and infection prevention
12. Reuse of disposable devices
13. Textile processing service
14. Medical waste management

15. Food borne disease prevention in healthcare facilities
16. Bundles of prevention:
 - Urinary tract infections
 - Hospital-acquired pneumonia
 - Surgical site infections
 - Infections due to infusion therapy (catheter-related bloodstream infections)
17. The intensive care unit: engineering and administrative infection control practices
18. The newborn nursery and the neonatal intensive care unit
19. The operating room
20. Wound care
21. Blood borne pathogen prevention
22. Infection in transplant recipients
23. Infections acquired in child care
24. Infection prevention of burn wounds
25. Ambulatory care settings
26. Gene therapy and infection control
27. Antimicrobial stewardship-programmatic efforts to optimize antimicrobial use
28. Education of healthcare workers in the prevention of healthcare associated infections
29. Patient safety

Theoretical 2 units (34 hours)

Principal reference(s):

- 1) Hospital Infection Prevention, Wattal, Chand, Khardori, last ed.
- 2) Basic Concepts in Infection Control, 3rd ed. (2016) by International Federation of Infection Control.
- 3) Hospital Airborne Infection Control, Wladyslaw Kowalski, last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Principles of Sterilization and Disinfection

Materials

Code of the course: 14

Number of Credits: 1

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

- Defines asepsis, sterilization, disinfection
- Can discuss sterilization and disinfection methods to be applied in medical applications
- Defines the general principles of sterilization and disinfection for medical devices and instruments.
- Implement the international standards for Sterilization and disinfection of medical instruments and devices.

Course description:

Provides knowledge and skill development relates methods of sterilization and disinfection for the student

Main topics: 17 hours

1. Sepsis and surgical environment (Terms / Sources of pollution / Application of principles)
2. Sterilization (Final sterilization / Storage / Distribution)
3. Disinfection and sterilizing (sterilization purposes / final sterilization / Environmental disinfection techniques / Processes / methods / factors affecting the choice of a variety of factors disinfection

Theoretical 1 unit (17 hours)

Principal reference(s):

- 1) Disinfection, Sterilization, and Preservation, Seymour Stanton Block, last ed.
- 2) Guideline for Disinfection and Sterilization in Healthcare Facilities, Centers for Disease Control and Prevention.
- 3) Russell, Hugo & Ayliffe's: Principles and Practice of Disinfection, Preservation and Sterilization, 5th Edition.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Clinical Epidemiology

Code of the course: 15

Number of Credits: 2

Type of the course: Theoretical

Prerequisite: Basic Epidemiology

Principal objective(s) of the course:

To become familiar with epidemiologic terminology, outcome measures, and study designs; to appreciate application of epidemiology to subfields (e.g., infectious diseases, reproductive health, genetics); and to apply epidemiologic methods to current public health issues.

Course description:

This course introduces the basic principles and methods of epidemiology, with an emphasis on critical thinking, analytic skills, and application to clinical practice and research. Topics include outcome measures, methods of adjustment, surveillance, quantitative study designs, and sources of data. Designed for those with a clinical background, the course will provide tools for critically evaluating the literature and skills to practice evidence-based medicine.

Main topics: (17 hours)

1. The definition of epidemiology / disease concepts and models in epidemiology
2. Regulations for the prevention of communicable diseases
3. Control and prevention measures
4. Standards and prevention measures
5. The risk carriers of infectious agents –vaccination
6. The role of the laboratory in the fight against infectious diseases and epidemics
7. Vaccines / vaccination and health programs
8. Types of vaccines
9. Control of infectious and contagious diseases
10. Hospital infections
11. General human ecology
12. Types of epidemiological studies
13. Epidemiology of healthcare-associated infections
14. Molecular methods in healthcare epidemiology
15. Infection control and use of evidence-based medicine
16. Investigating endemic and epidemic healthcare-associated infections
17. Epidemiological methods for investigating infections in healthcare settings

18. Economic evaluation of healthcare-associated infections and infection control Interventions
19. The development of infection surveillance and control programs
20. Surveillance of healthcare-associated infections
21. The potential of telemedicine for hospital epidemiology

Theoretical 1 unit (17 hours)

Principal reference(s):

- 1- *Medical Epidemiology* (Greenberg) Latest ed.
- 2- *Epidemiology* (Leon Gordis) Latest ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Occupational Health

Code of the course: 16

Number of Credits: 2

Type of the course: Theoretical/ Practical

Prerequisite: None

Principal objective(s) of the course:

Upon successful completion of this course, the student will have demonstrated the ability to:

1. Identify hazards in the home or workplace that pose a danger or threat to their safety or health, or that of others.
2. Control unsafe or unhealthy hazards and propose methods to eliminate the hazard.
3. Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the Ontario Occupational Health and Safety Regulations as well as supported legislation.
4. Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors.
5. Indicate a comprehension of the changes created by WHMIS legislation in everyday life.
6. Identify the decisions required to maintain protection of the environment, home and workplace as well as personal health and safety.

Course description:

This course introduces the student to the study of workplace occupational health and safety. The student will learn safe work practices in offices, industry and construction as well as how to identify and prevent or correct problems associated with occupational safety and health in these locations as well as in the home. The course is designed to assist the student with the implementation of safe healthy practices at work and at home.

Main topics: 34 hours

1. Prevention of occupationally acquired viral hepatitis in healthcare workers
2. Prevention of occupationally acquired Human Immunodeficiency Virus (HIV) infection in healthcare workers
3. Vaccination of healthcare workers
4. Prevention of occupationally acquired diseases of healthcare workers spread by contact, droplet, or airborne routes (other than tuberculosis)

5. Prevention of occupationally acquired healthcare-associated infections in diagnostic laboratories
6. Prevention of occupationally acquired infections in prehospital healthcare workers
7. Prevention of occupationally acquired in posthospital healthcare workers

Theoretical 1.5 units (25 hours)

Practical 0.5 units (17 hours)

Principal reference(s):

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Antibiotic Resistance

Code of the course: 17

Number of Credits: 2

Type of the course: Theoretical/ Practical

Prerequisite: Medical Bacteriology

Principal objective(s) of the course:

Upon completing the course, students will be able to:

- Explain what antibiotic resistance genes (ARGs) and antibiotic resistant bacteria (ARBs) are and the origins of ARGs (the resistance).
- Describe the various mechanisms for resistance and important classes of resistance genes.
- Compare and analyze diverse viewpoints on controversial issues related to sources of ARGs/ARBs in relationship to humans, animals, and the environment (One Health).
- Summarize how several different human practices influence the evolution/ecology of ARGs/ARBs.

Course description:

This course explores how the global use and abuse of antibiotics has profound consequences on the health of humans, animals, and the environment.

Main topics: (34 hours)

1. Measuring antibiotic use and resistance, antimicrobial stewardship-programmatic efforts to optimize antimicrobial use
2. Multiply drug-resistant pathogens-Epidemiology
3. Molecular biology of resistance

Theoretical 1.5 units (25 hours)

Practical 0.5 units (17 hours)

Principal reference(s):

- 1) Antibiotic Resistance: Mechanisms and New Antimicrobial Approaches, Kateryna Kon, Mahendra Rai, last ed.
- 2) Antibiotic Resistance, Karl Drlica, last ed.
- 3) Antibiotic Resistance, Anthony R.M. Coates, last ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Immunology

Code of the course: 18

Number of Credits: 1

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Students who complete the course will have gained knowledge in:

Understanding the roles of immunology in protection against disease and autoimmune disorders to choices in their daily lives.

Course description:

Introduces the principles of immunology including: development of the immune system, innate immunity, immunoglobulin structure and genetics, antigen-antibody reactions, the major histocompatibility complex reactions and antigen presentation, T-cell receptors, T-cell activation and effector functions, energy and apoptosis, cytokines, immune responses to infectious organisms, autoimmune diseases.

Main topics: 17 hours:

1. Production / proliferation and differentiation of lymphoid cells
2. Foundations and humoral immune response
3. Foundations and T-lymphocytes response
4. Anti gen and antigen presenting cells
5. Histocompatibility system
6. Tolerance and auto immunity
7. Cytokines and cytokine reception
8. Immune responses
9. Cellular and molecular basics and the adaptive immune response and antigen recognition
10. Complement
11. Pathological reaction of the T-immune system

Theoretical 1 unit (17 hours):

Principal reference(s):

1. Basic Immunology: Functions and Disorders of the Immune System, Abul K. Abbas MBBS, last ed.

2. Janeway's Immunobiology, last ed.
3. Kuby Immunology, last ed.
4. Clinical Immunology: Principles and Practice, 4e (Rich, Clinical Immunology) 4th Edition.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Principles of Safety in Laboratory

Code of the course: 19

Number of Credits: 1

Type of the course: Theoretical

Prerequisite: None

Principal objective(s) of the course:

Explain and describe the responsibility of regulatory agencies such as EPA, OSHA, DOT, and NRCI. To know the principles and regulations of safety in laboratory.

Course description:

To become familiar the principle of protection in different medical laboratories

Main topics: (17 hours)

1. The general principles of safety and protection in laboratory and personnel training
2. The physical properties of laboratory (health center, Hospital, Central laboratory)
3. The principles of protection in sampling and sample transportation
4. The principles and methods of Sterilization
5. The principles of protection in biochemistry laboratory
6. The principles of protection in hematology laboratory
7. The principles of protection in Microbiology laboratory
8. The principles of protection in hormone and ionizing radiation
9. The principles and methods of laboratory waste disposal

Theoretical 1 unit (17 hours)

Principal reference(s):

Laboratory biosafety manual, World Health Organization, 3rd ed.

Biosafety in Microbiological and Biomedical Laboratories, Centers for Disease Control and Prevention National Institutes of Health, 5th ed.

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Internship

Code of the course: 20

Number of Credits: 3

Type of the course: Practical

Prerequisite: None

Principal objective(s) of the course:

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Course description:

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Main topics: 153 hours

1. The development of infection surveillance and control programs (Infection control committee)
2. The healthcare epidemiologist
3. The expanded role of the nurse in hospital epidemiology
4. Surveillance of healthcare-associated infections
5. Incidence and nature of endemic and epidemic healthcare-associated infections
6. Epidemiological methods for investigating infections in healthcare settings
7. Investigating endemic and epidemic healthcare-associated infections
8. Use of computerized systems and internet in healthcare epidemiology
9. Leadership and management for healthcare epidemiology
10. The role of professional and regulatory organizations in infection control
11. Public reporting of healthcare-associated infection rates
12. The role of the laboratory in control of healthcare-associated infections
13. The inanimate environment
14. Clinical laboratory-acquired infections
15. Sterilization and disinfection
16. Medical waste management
17. Food borne disease prevention in healthcare facilities
18. Dialysis-associated complications and their control
19. The intensive care unit: HAI epidemiology, risk factors, surveillance, engineering and administrative infection control practices, and impact
20. The newborn nursery and the neonatal intensive care unit
21. The operating room
22. Pharmacy service
23. Central service supply
24. Textile processing service
25. Environmental services
26. Ambulatory care settings
27. Reuse of disposable devices

28. Hand hygiene and improving compliance with hand hygiene
29. Personnel health services (vaccination programs, occupational exposure, ...)
30. Design and maintenance of hospital ventilation systems
31. Isolation precautions
32. Patient safety
33. Urinary tract infections
34. Hospital-acquired pneumonia
35. Surgical site infections
36. Infections due to infusion therapy (Catheter-related bloodstream infections)
37. Infections of implantable cardiac and vascular devices
38. Infections in skeletal prostheses
39. Central nervous system infections
40. Infectious gastroenteritis including *c. difficile*
41. Blood borne pathogen prevention
42. Infection control and antimicrobial –resistant pathogens
43. Healthcare-associated fungal infections
44. Tuberculosis
45. Healthcare-associated respiratory viral infections
46. Healthcare-associated sinusitis
47. Healthcare-associated ocular infections
48. Infection in transplant recipients
49. Infections acquired in child care centers
50. Healthcare-associated infections in dental, oral and maxillofacial surgery
51. Healthcare-associated infections in obstetric patients
52. Healthcare-associated infections in anesthesia
53. Healthcare-associated infections in endoscopy
54. Infections associated with physical therapy, including hydrotherapy, and respiratory therapy
55. Healthcare-associated infections in radiology
56. Infections of burn wounds
57. Education of healthcare workers in the prevention of healthcare associated infections

Practical 3 units (153 hours)

Principal reference(s):

Student assessment practices: Final Exam (written), Class Attendance and Class Participation

Title of the Course: Seminar

Code of the course: 21

Number of Credits: 1

Type of the course:

Prerequisite:

Principal objective(s) of the course:

Creating and increasing students' ability to adapt oral knowledge to practical knowledge, and to analyze, express and solve problems in the fields of Nosocomial Infection Control.

Course description:

In this course, each student being guided by a department professor chooses a specific topic related to problems existing in the fields of Nosocomial Infection Control. Then, he/she begins to gather scientific information about that topic from books and magazines, offers suggestions systematically to solve the problem, and prepares and delivers an article with the professor's guidance.

Principal reference(s):

- Issues related to infection prevention and control

Student assessment practices: Present the literature review, Class Attendance and Class Participation

Title of the Course: Thesis

Code of the course: 22

Number of Credits: 6

Type of the course:

Prerequisite:

Principal objective(s) of the course:

Engaging students in research in the field of Infection Prevention and Control aiming to create innovation and reduce the complication of Infection Prevention and Control

Course description:

In this course, students must choose a topic -- based on the needs of the country -- for their thesis using their information about Infection Prevention and Control methods and complications and with the help of different existing studies and researches together with their own skill in designing and implementing a research study.

Principal reference(s):

Subject on field of Infection Prevention and Control

Student assessment practices: Thesis defense