



## **Advanced Clinical Microbiology Course Specification MD Degree in Clinical and Chemical Pathology**

**Program on which the course is given:** Doctorate in Clinical and Chemical Pathology

**Department offering the program:** Clinical and Chemical Pathology Department

**Department offering the course:** Clinical and Chemical Pathology Department

**Course code:** CCP922CM

**Element of the program (Compulsory/Elective):** Elective course

**Academic year:** 2015-2016

**Date of approval:** July 2015

**Credit points:** 10 Credit points

**Course duration:** 30 weeks

**Teaching hours:** Theoretical 70% and Practical 30%

**Course Coordinators:**

- Prof. Mona Wassef
- Prof. Nevein El Rasheedy



## **I. AIM OF COURSE**

To develop MD clinical pathologist having outstanding skills and knowledge needed for optimum and safe microbiological processing of clinical samples with excellent interpretation and correlation of test results with the clinical situation of the patient, following and reflecting the infection control guidelines, and applying the standard rules for quality assurance, research and continuous learning processes. The graduate will be able to communicate with customers and colleagues



## **II. INTENDED LEARNING OUTCOMES**

### **A. Knowledge and understanding:**

**By the end of the course the candidate should be able to:**

1. Define the viral, bacterial, mycobacterial, and fungal causative agents of infectious diseases.
2. Identify acceptable guidelines for specimen collection and transport
3. Identify molecular basis of infectious diseases.
4. Describe pathogenesis of infectious diseases
5. Recognize the management of different viral, bacterial, and fungal infections
6. List the compulsory and optional vaccines given in childhood and adulthood with their mode of action, possible complications and schedule for administration.
7. Explain the requirements for antimicrobial susceptibility tests.
8. Explain different mechanisms of antimicrobial resistance.
9. Define the clinically important zoonotic diseases
10. Review transplantation and transfusion associated infections
11. Discuss the clinical impact of emerging infections.
12. Define the role of automation in microbiology laboratory.
13. List and briefly describe some of the blood culture systems available to the microbiologist, including the self-contained systems and instrument-based systems.
14. List and describe some of microbial identification and sensitivity systems including the self-contained systems and instrument-based systems.
15. Define quality management system essentials in microbiology lab.
16. Explain the requirements for use of reference laboratories, and elements of patient reports
17. Compare the maintenance of reference quality control stocks in bacteriology, mycology, mycobacteriology, virology, and parasitology.
18. Outline quality assurance program for the microbiology lab.

### **B. Intellectual skills:**

**By the end of the course the candidate should be able to:**

1. Formulate quality and safety manuals for microbiology lab.
2. Construct quality assurance systems needed to verify microbiology results.
3. Design log to check performance for instruments and media used in microbiology lab.
4. Collect and interpret culture and sensitivity data needed for surveillance.
5. Criticize and design antimicrobial policy for a health care organization.
6. Summarize SOPs needed for the best practice in a clinical microbiology lab.
7. Apply quality assurance methodologies in automation.



**C. Professional and practical skills:**

**By the end of the course the candidates should be able to**

1. Diagnose viral, bacterial, mycobacterial, and fungal pathogen.
2. Prepare sensitivity for phenotypic diagnosis of ESBL, AMPc, and metallo-beta lactamase producing Gram –ve bacteria.
3. Diagnose multidrug resistance pathogens
4. Integrate the Q.A. measures in microbiology practice.
5. Perform count of cells in body fluids
6. Perform count and analysis of semen
7. Perform count of bacteria in semi quantitative cultures
8. Operate automated systems in microbiology lab. for identification of bacterial pathogens and their antimicrobial susceptibility testing.
9. Operate automated systems in microbiology lab. for identification of mycobacteria and their antimicrobial susceptibility testing
10. Operate automated systems in microbiology lab. for culture of bacterial and fungal pathogens in blood and body fluids.

**D. General and transferable skills:**

**By the end of the course the candidates should be able to:**

1. Apply leadership and teamwork skills required to implement laboratory policies.
2. Participate in multidisciplinary and scientific meetings
3. Communicate effectively orally and in writing
4. Adopt ethical behavior in dealing with medical and non-medical laboratory staff,
5. Treat patients with empathy respecting their dignity and confidentiality.
6. Demonstrate competent use of information technology including the use of word processing, databases, statistical programs, laboratory and hospital information systems
7. Expand and enhance their own knowledge and abilities through adopting life-long learning practices.
8. Acquire communication skills with internal and external microbiology lab customers.



### III. COURSE CONTENT

#### **A) Recent advances in the following subjects:**

##### **1. Medical Virology**

- a. General virology advanced level
- b. DNA viruses advanced level
- c. RNA viruses advanced level
- d. Oncogenic viruses advanced level
- e. Viral chemotherapy advanced level

##### **2. Medical Mycology**

- a. Superficial, cutaneous and mucocutaneous fungal infections
- b. Systemic fungal infections
- c. Opportunistic infections
- d. Antifungal chemotherapy

##### **3. Medical Bacteriology**

- a. Gram positive cocci and bacilli advanced level
- b. Gram negative cocci and bacilli advanced level
- c. Miscellaneous group of bacteria advanced level
- d. Anaerobes advanced level
- e. Mycobacteria advanced level

##### **4. Infectious Diseases advanced level:**

Infections including but not restricted to respiratory tract infections, GIT infections, Endocarditis, Hepatitis, Acute febrile illness, fever of unknown origin, Mycobacterial infections, Fungal infections, HIV, Antimicrobial chemotherapy & resistance, Infections in ICU, dialysis units, endoscopy, skin and soft tissue infections, bone and joint infections, genitourinary infections, bloodstream infections, zoonotic infections, transfusion and transplantation-associated infections. In addition to zoonotic, transfusion and transplantation-associated, as well as emerging infections.

##### **5. Infection Control and Hospital Epidemiology advanced level**

##### **6. Microbial Genetics advanced level**

##### **7. Immunization**

##### **8. Antimicrobial Policies**

- a. Mode of resistance
- b. Surveillance



c. Policy

**B) Tutorial Group Discussions**

1. Gram positive cocci
2. Gram positive bacilli
3. Gram-negative
4. *Enterobacteriaceae*
5. Gram-negative Non Fermenters
6. Clostridia
7. Other anaerobes
8. Antimicrobial resistance & Diagnosis and management of superbug
9. Antibiotic Stewardship With 2-3 clinicians
10. *Mycobacterium Tuberculosis* and MOTT 1
11. *Mycobacterium Tuberculosis* and MOTT 2
12. *Mycobacterium Tuberculosis* and MOTT 3
13. Community and healthcare- associated infections caused by *Mycobacteria*
14. Mycology (Yeast)
15. Mycology (Molds)
16. Update on antifungal chemotherapy
17. General Virology
18. Special Virology I (RNA)
19. Special Virology II (DNA)
20. Antiviral Chemotherapy
21. Update on HBV and HCV WITH Medical clinician
22. Emerging viral infections
23. Infection Control
24. Establishing an Infection Control Program for Acute Respiratory Infections and Ensuring Pandemic Preparedness
25. Updates in vaccinations with pediatrician
26. Zoonotic diseases
27. Seasonal infections
28. Immunological diagnosis of infectious disease with staff member of immunology
29. Transfusion associated infections with hematologist.
30. Infections in immunocompromised with specialist from oncology unit
31. Update on diagnosis of acute diarrhea with highlighting on *Escherichia coli* (STEC) serotype O104 outbreak causing haemolytic syndrome (HUS) in Germany and France: from an outbreak of HUS in Germany 2011, could it happen again?
32. Diagnosis of *C difficile* Infection
33. Update in *H.pylori*
34. Comprehensive diagnostic strategy for blood culture-negative endocarditis
35. New Techniques in semen analysis with andrologist
36. Quality Assurance in Microbiology



**C) Practical Classes and Lab. and Hospital Training:**

- 1- Examination of sputum
- 2- Examination of throat and mouth specimens
- 3- Antibacterial susceptibility
- 4- Examination of urine
- 5- Examination of fecal specimens
- 6- Identification of fungi
- 7- Antifungal susceptibility
- 8- Identification techniques used in microbiology
- 9- Examination of pus, ulcer material and skin specimens
- 10-Examination of CSF and effusions
- 11-Examination of urogenital specimens
- 12-Culturing blood
- 13- Examination of semen
- 14-Molecular biology techniques
- 15- **Hospital training:**
  1. Patient management; Interactive sessions with clinical and laboratory experts on important infections
  2. Infection control
  3. Antimicrobial policy implementation



**D) Distribution of course contents**

<b>Subject</b>	<b>Students Presentations, Active learning ,Tutorials, Journal club &amp; Newsletter (hrs)</b>	<b>Group Discussion (hrs)</b>	<b>Practical Classes &amp; Hospital training (hrs)</b>	<b>Total (hrs)</b>	<b>% of Total</b>
<b>1. Medical Virology</b>	10	2		12	6%
<b>2. Medical Mycology</b>	8	2	9	19	9.8%
<b>3. Medical Bacteriology &amp; Mycobacteria</b>	25	2	12	39	20%
<b>4. Infectious Diseases advanced level:</b>	20	8	42	70	36%
<b>5. Infection Control and Hospital Epidemiology advanced level</b>	6	2	9	17	8.8%
<b>6. Microbial Genetics &amp; applications of molecular biology techniques advanced level</b>	2	2	9	13	6.7%
<b>7. Immunization</b>	2	2		4	2%
<b>8. Antimicrobial Policies</b>	4	2	9	15	7.7%
<b>9. Quality control in microbiology lab</b>	4	2		6	3%
<b>Total</b>	81	24	90	195	100





## IV. TEACHING METHODS

The following teaching/learning experiences are used to achieve the ILOs of this course,

- **Team-based learning sessions** (integrated active learning) and few lectures on selected topics. TBL sessions are held once weekly and each session is followed by an assignment that the candidate has to fulfil.
- **Case discussions in Microbiology and Infectious Diseases**
  - a. **Journal club** Discussion of recent published articles on infectious diseases, microbiology, diagnostic tests, epidemiology
  - b. **Microbiology newsletter** an update on epidemiological information, and new test implementation.
- **Assignments**, both individual and group including essay, presentation, SOPs and flow chart preparation.
- **Observation of laboratory methods**
- **Practical laboratory training**
- **Scientific meetings, case presentation and discussion**
- **Hospital training:**
  4. Patient management; Interactive sessions with clinical and laboratory experts on important infections
  5. Infection control
  6. Antimicrobial policy implementation

### TEACHING PLAN:

- **Students presentations, active learning and tutorials, Journal club and Microbiology newsletter:** 6 hours /week for 15 weeks.
- **Inter-active group discussions:** Usually involving clinicians and staff members of other lab. specialties 2 hours session / 2 weeks for 15 weeks to cover shared interesting subjects and emerging situations in clinical microbiology
- **Practical classes:** Observation of laboratory methods, practical laboratory training, and 6hours practical session / week for 15 weeks.
- **Hospital team work training** on Infection control and antimicrobial policy implementation 1 hour / 4 weeks for 15 weeks.
- **Scientific activities including:**
  - **Conferences:** Participation and/or attendance of at least 1 Clinical Microbiology session (4 hours) of ESLM conference (during 3 days / academic year)
  - **Workshops:** Participation of at least one workshop (3 successive days 2hours each / academic year)

# Cairo University - Faculty of Medicine

Clinical and Chemical Pathology Department

## MD Elective Course – Advanced Clinical Microbiology [CCP922CM]



### Time plan:

Item	Time schedule	Hours / week	Total hours
<b>1-Students presentations, active learning and tutorials, Journal club and Microbiology newsletter</b>	3 times/week; 2 hours each between 10 am to 12 pm for 15 weeks	<b>6</b>	<b>90</b>
<b>2- Inter-active group discussions involving clinicians and staff members of other lab. specialties</b>	2 hours / 2 week from 12 pm to 1 pm for 15 weeks	<b>1</b>	<b>15</b>
<b>3- Practical session and Hospital team work training on Infection control and antimicrobial policy implementation</b>	6 hours /2 week	<b>6</b>	<b>90</b>
<b>Total</b>			<b>195</b>
<ul style="list-style-type: none"><li>• <b>Scientific activities:</b><ul style="list-style-type: none"><li>- <b>Conferences,(ESLM)</b></li><li>- <b>Workshops</b></li></ul></li></ul>	At least 1 Clinical Microbiology session At least 1 workshop		
<ul style="list-style-type: none"><li>• <b>Lab. Training</b></li></ul>	At least 6 month, 4 full days per week		

All activities are registered and achievements are continuously monitored in the student's logbook.



## V. LIST OF REFERENCES

### **Basic materials:**

- Course notes

### **Essential books (text books):**

1. Control of Communicable Diseases Manual, 17<sup>th</sup> ed
2. The Manual of Clinical Microbiology, 11<sup>th</sup> ed.
3. M100S, Performance Standards for Antimicrobial Susceptibility Testing, 26<sup>th</sup> ed.

### **Recommended books:**

1. Mandell, Douglas, and Bennett's Principles and Practice of infectious Diseases, 5<sup>th</sup> ed.
2. Baily and Scott Diagnostic Microbiology, 13<sup>th</sup> ed

### **Periodicals:**

Infection, Journal of clinical microbiology, Journal of Infectious Diseases, American Journal of infection control, Annuals of Clinical Microbiology and Resistance

**About The References:** The resources listed are NOT meant to be comprehensive guides to the examination. They are merely suggestions

## VI. TEACHING AND LEARNING FACILITIES

### **Facilities used for teaching this course include:**

- Lecture hall provided with a white board and audio-visual aids (data-show)
- Post graduate laboratory
- Department laboratories (hospital labs)
- Post graduate medical School Library



## VII. ASSESSMENT

### Assessment criteria:

The prerequisite for sitting to the final exam is 75% attendance of the lectures and fulfilling all the credit points specified for the scientific activities, the training program of the elective course which should be registered in the log book.

### Assessment tools:

- Continuous formative assessment is carried throughout the course and registered in the logbook
- Final summative examination will be carried at the end of the course.

**Assessment schedule:** The final exam is held twice per year in May and November.

### Examination description:

- One written exam paper three hour duration.
- Oral examination; one station 4- 8 examiners.
- Practical examination held on three successive days for isolation, identification, and antimicrobial susceptibility testing of unknown pathogens from three clinical samples.

### Weighing of assessment

Exams	Mark	Weight	Intended Learning Outcomes
Written	200	40%	To assess ILOs: A(1-18), B(1-6)
Oral	150	30%	To assess ILOs: A(1-18), B(1-6), D(4,5,6,7)
Practical	150	30%	To assess ILOs: B(4,7), C(1-10), D(1,2,3,4,8),
Total	500	100%	

### Head of Department

*Prof. Dr. Fatma El Mougy*