



**Jordan University of Science and Technology**  
**Faculty of Applied Medical Sciences**  
**Department of Medical Laboratory Sciences**  
**Course Syllabus**

| <b>Course Information</b>   |   |
|---|---|
| <b>Course Title</b>   | Diagnostic Immunology and Serology (2 credit hours)         |
| <b>Course Code</b>  | LM 335  |
| <b>Prerequisites</b>  | LM 232  |
| <b>Course Website</b>   | <a href="http://www.just.edu.jo">http://www.just.edu.jo</a> |
| <b>Instructor</b>   | Dr. Muhamad Shakhatreh                                      |
| <b>Office Location</b>  | M5L-4; Room no. 2   |
| <b>Office Phone #</b>   | 23874   |
| <b>Office Hours</b>   | To be determined  |
| <b>E-mail</b>   | mkshakhatreh@just.edu.jo                                    |
| <b>Course Description</b>   |   |
| <p>This course introduces the concepts of clinical immunology and serology for clinical laboratory practice. It covers essential theoretical principles along with serology techniques most commonly used in the lab. It provides students with knowledge required to perform different serological techniques used in disease diagnosis. It consists of the theory, application, and performance of common serological testing used in a clinical lab including agglutination reactions, precipitation reactions, complement fixation test (CFT), direct and indirect hemagglutination (HA and IHA), hemagglutination inhibition (HAI), Radioimmunoassay (RIA) including instrumental production of immune serum, labeling of antigen, commercial kits, immunodiffusion, immunoelectrophoresis, direct and indirect fluoroimmunoassays (FIA), Enzyme-linked immunosorbent assay (ELISA), and immunoblotting. The course is accompanied by a practical laboratory applications course (LM 337).</p> |   |

| <b>Textbook</b>         |  |
|-------------------------|--|
| <b>Title</b>            | Manual of Clinical Laboratory Immunology                                 |
| <b>Author(s)</b>        | Barbara Deetrick   |
| <b>Publisher</b>        | American society of microbiology   |
| <b>Year</b>             | 2002   |
| <b>Edition</b>          | 6th  |
| <b>Book Website</b>     |  |
| <b>Other references</b> | Medical immunology, internet clinical immunology and serology resources. |

| <b>Assessment</b>  |                          |                   |
|--------------------|--------------------------|-------------------|
| <b>Assessment</b>  | <b>Expected Due Date</b> | <b>Percentage</b> |
| <b>First Exam</b>  | Week 5                   | <b>30%</b>        |
| <b>Second Exam</b> | Week 10                  | <b>30%</b>        |
| <b>Final Exam</b>  | To be determined         | <b>40%</b>        |

| <b>Course Objectives</b>  | <b>Percentage</b> |
|---|-------------------|
| 1. To provide students with basic principles of antigen antibody reactions, precipitation, agglutination, complement fixation (CF), Radioimmunoassay (RIA), ELISA, and fluorescent antibody technology. | 30%               |
| 2. To introduce students to applications of immunological techniques in the diagnosis of bacterial infections, viral infections, parasitic infections, as well as immunological diseases                | 50%               |
| 3. To introduce students to principles and techniques for laboratory assessment of host immunity  | 20%               |

| <b>Teaching &amp; Learning Methods</b> |
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| Lectures, PowerPoint Presentations.    |

| <b>Learning Outcomes: Upon successful completion of this course, students will be able to:</b>   |                     |
|--|---------------------|
| <b>Related Objective(s)</b>  | <b>Reference(s)</b> |
| 1. Describe the principles of Ag-Ab reactions and their usage in clinical laboratories.  |                     |
| 2. Perform sero-identification of bacteria, Widal test, Brucella test, blood grouping, cold agglutinins, and Paul Bunnell test.  |                     |
| 3. Perform CRP, RA, Pregnancy test, Meningo test, IHA for hydatid disease, and HbsAg.  |                     |
| 4. Utilize precipitation tests to do Lancefield grouping of Streptococci, double diffusion, Immunoelectrophoresis and immunofixation, Radial immunodiffusion (RID) to quantitate Ig, C3, C4, Haptoglobulin, etc. |                     |
| 5. Use complement fixation test (CFT) for antibody detection of viruses, bacteria, and parasites, as well as tissue typing.  |                     |
| 6. Utilization of Radioimmunoassay RIA and ELISA technology to detect hepatitis markers, total IgE, allergen specific IgE, BHCG, TORCH, etc.   |                     |
| 7. Use direct immunofluorescence (DIF) for detection of Chlamydia, Treponema, Viruses, and immune complexes in tissues.  |                     |

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| 8. Use immunofluorescence to detect anti-nuclear antibodies (ANA), anti-mitochondrial antibodies (AMA), ASMA, anti-dsDNA, anti-parietal Cell Antibody APCA, anti-neutrophil cytoplasmic antibody (ANCA), and antibodies to parasites. |  |
| 9. Perform E-rosette count, B-cell count, lymphocyte transformation test (LTT), and evaluate skin test results.   |  |

| Course Content |   |                                |
|----------------|---|--------------------------------|
| Week           | Topics  | Chapter in Textbook (handouts) |
| 1              | 1-Agglutination reactions:<br>A:Direct agglutination reactions:<br>- Serological identification of bacteria.<br>- Widal test.   |                                |
| 2              | - Brucella agglutination test.<br>- Blood grouping- ABO-Rh test.<br>- Cold agglutinins and Heterophile antibodies.<br>B:Passive agglutination or indirect agglutination.<br>- C-reactive protein tests.<br>- RA-latex test<br>- Meningo-latex test. |                                |
| 3              | C:Passive haemagglutination tests:<br>- Hepatitis B surface Antigen(HbsAg).<br>- Ecchinococcus granulosus antibodies(Hydatid cyst).<br>- Monospot test and Paul-Bunnell test.   |                                |
| 4              | 2- Precipitation reactions:<br>A: Tube precipitation reactions:<br>- Ascoli test –Anthrax.<br>- Lancefield grouping of Streptococcus.<br>B-:Gel precipitation reactions:<br>- Double diffusion – Antigen identification and relation.               |                                |
| 5              | <b>Exam 1</b><br>- Radial immunodiffusion: Immunoglobulins, Complement  |                                |
| 6              | Ceruloplasmin, Haptoglobulins, Transferin.<br>Immuno-electrophoresis and Immunofixation   |                                |
| 7              | 3- Complement fixation tests:<br>- Antibodies to viruses, bacterial antigens, parasites.  |                                |
| 8              | - Microcytotoxicity tests.<br>4-Neutralization reactions:<br>- Anti Streptolysin O test.<br>- Virus infectivity tests.  |                                |

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|-------|--|--|
| 9-10  | <p>5-Radioimmunoassay :</p> <ul style="list-style-type: none"> <li>- Hepatitis markers</li> <li>- Total serum IgE-Prest.</li> <li>- Allergen specific IgE – Radio-Allergo-Sorbent Test (RAST).</li> <li>- BHCG.</li> </ul> <p><b>2<sup>nd</sup> Exam</b></p>   |  |
| 11-12 | <p>6- Enzyme-linked immunosorbent assay(ELISA):</p> <ul style="list-style-type: none"> <li>- TORCH test.</li> <li>- HIV test.</li> <li>- BHCG</li> <li>- Total and specific IgE.</li> </ul>  |  |
| 13-14 | <p>7-Flourescent Antibody technology:</p> <ul style="list-style-type: none"> <li>- Detection of Antigens: Chlamydia, Treponema.</li> <li>- Detection of immune complexes in tissues.</li> <li>- Detection of Antibodies:<br/>ANA, AMA, ASMA, AntiDNA, APCA, ANCA</li> <li>- Detection of Ab to Toxoplasma, Trichinella, Amoeba.</li> </ul> |  |
| 15    | <p>8-Assessment of Cellular Immunity:</p> <ul style="list-style-type: none"> <li>- T-cell count – E-Rosette.</li> <li>- B-Cell count.</li> <li>- T-cell function: Lymphocyte transformation test.</li> <li>- Skin tests</li> </ul> <p>New methods used in clinical immunology and serology</p>   |  |
| 16    | <b>Final Exam</b>  |  |

| <b>Additional Notes</b>   |  |
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| <p><b><u>Attendance policy:</u></b><br/>Mandatory for all of the lectures. Students are expected to attend more than 80% of lectures.</p> <p><b><u>Expected workload:</u></b><br/>Students are expected to attend all classes, and pass the exams.</p> <p><b><u>Feedback:</u></b><br/>Feedback or concerns from the students regarding the progression in the course and the material covered in the lecture can be discussed with the instructor at designated office hours or by appointment.</p> |  |

THE authoritative guide for clinical laboratory immunology. For over 40 years the Manual of Molecular and Clinical Laboratory Immunology has served as the premier guide for the clinical immunology laboratory. From basic serology testing to the present wide range of molecular analyses, the Manual has reflected the exponential growth in the field of immunology over the past decades.Â Written to guide the laboratory director, the Manual will also appeal to other laboratory scientists, especially those working in clinical immunology laboratories, and pathologists. It is also a useful reference for physicians, mid-level providers, medical students, and allied health students with an interest in the role that immunology plays in the clinical laboratory. From the Back Cover. In clinical laboratories, fluorescent antibody tests are currently used for detection of bacterial, viral, and fungal infections as well as for bioimaging of tissue samples. A number of respiratory viruses can be directly detected in nasopharyngeal samples using direct fluorescent antibody (DFA) test.Â In: Rose NR, Hamilton RG, Detrick B, eds. Manual of Clinical Laboratory Immunology. Washington, DC: ASM Press; 2002:6-25.

6. Ridker PM, Morrow DA. Start by marking "Manual of Clinical Laboratory Immunology" as Want to Read: Want to Read savingâ€¦  
Want to Read.Â Featuring the latest on standard and cutting-edge immunological tests and procedures in clinical laboratory immunology, the much-anticipated sixth edition of the Manual of Clinical Laboratory Immunology (MCLI) reflects the continued evolution of clinical immunology. Considered the "bible" of the clinical immunology laboratory, MCLI6 provides an up-to-date description of the. Featuring the latest on standard and cutting-edge immunological tests and procedures in clinical laboratory immunology, the much-anticipated sixth edition of the Manual of Clinical Laboratory Immunology (MCLI) re

Essential Clinical Immunology begins with the basic concepts and then details the immuno-logical aspects of various disease states involving major organs of the body. The book explores how we can better understand disease and its treatment through clinical immunology. Looking forward, each chapter concludes with patterns for future research. John B. Zabriskie (M.D., Columbia College of Physicians and Surgeons) is Professor Emeritus and former head of the Laboratory of Clinical Micro-biology and Immunology at The Rockefeller University, New York, New York.Â Manual of Clin-ical Laboratory Immunology. Washington, DC: American Society for Microbiol-ogy; 1997. von Muhlen CA, Tan EM.