

The University of Texas at El Paso
College of Health Sciences
Clinical Laboratory Science Program

Serology (CLSC 3260)
Fall 2009

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Lectures: (Attendance required) Tuesday and Thursday, 11:00 – 11:50 a.m.

Office hours: Tuesday and Thursday, 12:00 – 1:00 p.m. and by appointment.

Required Textbooks:

Turgeon, M.L. (2003). *Immunology and Serology in Laboratory Medicine* (3rd ed). St. Louis, MO. Mosby .

Jarreau, P. (2005). *Clinical Laboratory Science Review a Bottom Line Approach* (3rd ed.) Louisiana State University Health sciences Center foundation. New Orleans.

Polansky, V.D. (2000). *Quick Review Cards for Clinical Laboratory Science Examinations*. F.A. Davis

Course description

Serology is the study of the non-cellular components in the blood known as serum. Serology is a branch of Immunology, which flourished during the 1900's to 1950's. During this period, attention was turned to research on the production and use of serum to control infection. Currently, the study of serology has broadened including the investigation of problems with the immune system such as autoimmune diseases, determining organ compatibility for transplantation, paternity testing, transfusion medicine, and forensics. The purpose of this course is to present the basic concepts of the science of serology, which emphasizes the detection of disease by the use of serological techniques, including some of the new developments and advances within this field. A review of basic immunologic theoretical concepts will be given along with explanations of the underlying theory of procedures performed. In lecture, we will discuss in detail the theory behind antigen antibody reactions, precipitation and agglutination, labeled immunoassays, and some special techniques. We will study the characteristics in the acquisition and development of infectious diseases and the laboratory detection of immunologic responses. We will also discuss immunologically and serologically related disorders such as autoimmune disorders.

Some hints on how to succeed in this course

It is essential to develop good study skills in order to succeed in any course you take. Good study skills not only save you time and energy, but also help you learn more effectively. Four study skills that will promote your learning are self-management, constructing good notes, reading to learn, and studying with others.

Self-management techniques:

It is critical that you will manage your time wisely. Organize yourself by planning a schedule. In this schedule you may want to record time for reading, reviewing and studying for tests. Adjust your schedule as the course progresses. Pace the course workload evenly. Use a study location free of distractions and review periodically.

Creating useful notes

Identify new ideas, summarize main ideas from lecture or text, create outlines, flow charts, trees, concepts; underline selectively and rewrite your notes. Power point handouts alone are not sufficient to master the material presented and the student must attend class and take notes.

Reading to learn

Determine your purpose for reading; preview the text (titles, summaries, diagrams); turn titles and headings into questions; read for main ideas; re-read, visualize, relate; review.

Study with others

Study groups is one of the best ways of learning. Review the subject, formulate questions, and discuss main ideas. Test each other for knowledge. Explain what you have learned to others. If you can clearly explain the material you have learned, then you can be sure you know your material well.

General Course Objectives

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

1. Describe the various quality control procedures performed in the clinical immunology / serology section of the medical laboratory and to comprehend the importance of quality control and quality assurance.
2. Develop a positive attitude toward clinical immunology / serology and appreciate the value of accurate testing and evaluation in providing the patient and the clinician with accurate tools for diagnosis, treatment, and prevention of disease.
3. Identify, describe, explain, and discuss the antigen-antibody interaction and its detection.
4. Define, diagram and explain, compare and contrast and interpret the advantages and disadvantages of a variety of serologic reactions utilized in the serology / clinical immunology section.

5. Describe the protective techniques and safety practices utilized in the clinical immunology / serology laboratory and fathom the consequences for not following such techniques and practices.
6. Discuss the significance of a four-fold rise in antibody titer as it relates to a variety of disease states for acute and convalescent patient specimen samples.
7. Assemble and prepare appropriate materials and equipment for the performance of test procedures and determine acceptability of results.

SPECIFIC COURSE OBJECTIVES

Cognitive Objectives

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

1. Discuss the occupational transmission of hepatitis virus and human immunodeficiency virus.
2. Describe the practice of universal precautions
3. Explain the proper handling of hazardous material and waste management, including infectious waste, chemicals etc.
4. Describe the principle of agglutination
5. Name and compare characteristics of at least five agglutination methods
6. Describe the major differences between direct and indirect agglutination
7. Compare and contrast agglutination vs precipitation
8. Name and briefly describe five precipitation methods
9. Compare the advantages and disadvantages of three precipitation methods
10. Describe electrophoresis technique
11. Explain the principle of electrophoresis
12. Describe and compare RIA, RAST, EIA, RIST
13. Differentiate immunofluorescent assays from other labeling techniques such as radioactive and enzyme label.
14. Calculate dilutions for the practice of clinical serology
15. Construct a flow chart and describe the laboratory detection of immunologic responses
16. Interpret the results of various serological tests and be able to discuss the possibility of false positive and false negative results.
17. Describe the etiology, epidemiology signs and symptoms and immunologic manifestations of *Brucella abortus*, *Francisella tularensis*, *Salmonella* species, *Rickettsial* species.
18. Describe the etiology, epidemiology, signs and symptoms of streptococcal infections.
19. Discuss the immunologic manifestations and diagnostic evaluation of streptococcal infection
20. Describe the etiology, epidemiology, signs and symptoms of primary, secondary and latent syphilis
21. Discuss the immunologic manifestations and diagnostic evaluation of syphilis

22. Discuss the principle and clinical applications of RPR, VDRL, FTA-ABS and MHATP.
23. Describe the etiology, epidemiology, signs and symptoms of Lyme disease as well as the immunologic manifestations and diagnostic evaluation.
24. Describe the etiology, epidemiology, signs and symptoms of the following viral infections: EBV, CMV, Rubella, Hepatitis A-E, HIV. Also discuss the immunologic manifestations and diagnostic evaluation tests for these viral infections.
25. Develop a chart containing the etiology, signs and symptoms and laboratory work up to diagnose SLE.
26. Explain the epidemiology signs and symptoms of lupus.
27. Discuss the laboratory evaluation of ANA's
28. Describe the etiology, epidemiology, signs and symptoms of rheumatoid arthritis.
29. Explain the diagnostic procedures used in the identification and evaluation of rheumatoid arthritis.
30. Integrate the knowledge gained during the course to solve and evaluate clinical cases given the appropriate data.

Affective Objectives

To show the appropriate responsible behaviors, students will demonstrate:

1. A positive attitude by being prepared for lecture and laboratory sessions completing assigned tasks on time and displaying self-motivation.
2. Organization by utilizing time effectively, sequencing and prioritizing tasks for completion with time constraints, and maintaining a neat clean work.
3. Attention to detail by diligently pursuing accuracy and documenting data accurately and legibly.
4. Problem solving ability by explaining purpose of each step in diagnosis, interpretation, procedure, recognizing discrepancies in techniques or procedures and repeating necessary lab tests when necessary.
5. Dependability by following directions, working independently after being given directions.
6. Stability and self-confidence by approaching and performing routine tasks confidently without assistance and maintaining composure.
7. Appropriate interpersonal skills by cooperating and communicating effectively with classmates and instructors and displaying courteous, considerate behavior and appropriate appearance.
8. Ethical behavior and integrity by respecting confidentiality of patient information, complying with professional standards and code of ethics, adhering to safety policies and abiding by all rules and regulations of the institution.

Psychomotor Objectives (For Laboratory)

I. Select reagents, perform procedures, interpret results, and evaluate the significance of the results for all determinations listed below:

Procedure	Minimum number performed with 100% accuracy or within $\pm 2SD$
Dilutions	5
Rheumatoid factor	3
Anti-streptolysin O	3
Febrile Agglutinins	3
Rapid Plasma Reagin	3
Anti-nuclear antibodies latex	3
Rubella	3
C-Reactive protein	3
Infectious mononucleosis	3
HCG	3
ELISA	3

II. Describe the procedure, look at prepared slides (if applicable), interpret results, and evaluate the significance of results for the tests listed below:

ELISA Antinuclear antibodies Dot blots Western blot
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III. Define terms and describe quality control procedures as they relate to all serological procedures.

Academic dishonesty

Absolute honesty and integrity are a critical aspect of your chosen profession. Confidentiality of patient information is another. These must be strictly observed. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable on whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Proven violations of the detailed regulations, as printed in the Handbook of Operating Procedures (HOP), and available in the Office of the Dean of Students, may result in sanctions ranging from disciplinary probation, to failing grade on the work in question, to a failing grade in the course, to suspension or dismissal, among others.

Grading Policy:

- There will be four exams on the material covered in class during the semester. You must take all four exams. If you take all four exams, the exam with the lowest score will be dropped and only the scores of the highest three exams will be part of your grade. If you miss an exam without a university accepted excuse you will get a zero on that exam and **NO exam will be dropped.**
- There will be four quizzes given at the beginning of the class. If you come to class after the quiz is over you can't take the quiz and you will get a zero. If you take all four quizzes, the quiz with the lowest score will be dropped and only the scores of the highest three quizzes will be part of your grade. If you miss a quiz without a university accepted excuse you will get a zero on that quiz and **NO quiz will be dropped.**
- No make up for exams or quizzes is allowed.
- Various assignments will be given during the semester. The assignments include selected articles related to Serology. Details about the nature of the assignments will be given during the first week of classes.
- There will be a comprehensive Final Exam in all the chapters that we covered in class during the final week.

Grade distribution among course tasks:

Exams	40 %
Quizzes	20 %
Final Exam	25 %
Assignments	15 %

Grading Scale:

90 - 100	A
80 - 89	B
75 - 79	C
< 75	F

COURSE SCHEDULE

Lecture	Topic
1-2	Introduction, Basic Immunologic Mechanisms
3-4	Theory of Immunologic and Serologic Procedure
5	Theory of Immunologic and Serologic Procedure
6	Exam # 1
7	The Immune Response in Infectious Disease
8	Streptococcal infections
9	Streptococcal infections, Syphilis
10	Syphilis
11	Tick-Borne Diseases
12	Cytomegalovirus
13	Exam # 2
14	Infectious Mononucleosis
15-16	Viral Hepatitis
17	Rubella Infection
18-19	AIDS
19-20	Hypersensitivity Reactions
21	Exam # 3
22	Immunoproliferative Disorders
23	Autoimmune Disorders
24	Tumor Immunology
25-26	Rheumatoid Arthritis
27	Exam # 4
28	Systemic Lupus Erythematosus
29	Review