



**Department of Biology**

**College of Science**

**University of Salahaddin**

**Subject: Immunology**

**Course Book: Fourth Class**

**Lecturer's name:**

**Theory: Taban K. Rasheed, PhD**

**Practical: Sonia Elia Ishaq, PhD student**

**Academic Year: 2023/2024**

## Course Book

<b>1. Course name</b>	Immunology
<b>2. Lecturer in charge</b>	Theory/ Dr.Taban K. Rasheed Practical/ Sonia E. Ishaq
<b>3. Department/ College</b>	Biology/Science
<b>4. Contact/ E-mail</b>	taban.rasheed@su.edu.krd Sonia.ishaq@su.edu.krd
<b>5. Time (in hours) per week</b>	Theory: 2hr./week Practical: 3hr./week
<b>6. Office hours</b>	To be return to the schedule on the office door of the instructors
<b>7. Course code</b>	SBIO404
<b>8. Teacher's academic profile</b>	<p><b>Dr.Taban Rasheed:</b>I graduate from Salahaddin University in 1991(Ranked 5<sup>th</sup> in collage) worked as assistant biology for three years. In 1997 I finished my MSc degree in HBV and start as Assistant Lecturer Teaching Practical Immunology, Practical Virology, Practical Mycology, Practical Medical Microbiology, and Practical Invertebrate Biology.</p> <p>In 2008 I get my PhD degree in Micro-immunology and from that time, I am in charge in teaching Immunology theory for 4<sup>th</sup> class students, teaching Virology theory for 3<sup>rd</sup> class students, Supervising Immunology and Virology Practical Laboratory, Teaching Advanced Immunology for Graduate student.</p> <p>In 2010 I was honored to be among the 25 Iraqi university staff that have been selected to visit USA through Fulbright Visiting Program for faculty development and capacity building. In 2011, I was accepted as a research fellow in George Mason University-Prince William Campus in Molecular and Microbiology Laboratory in USA to study HIV virus.</p> <p><b>M.Sc. Sonia Ishaq:</b> I graduated from Salahaddin University in 2011. In the same year I became an employee in college of science/ biology department. I worked as an assistant biology in practical laboratory especially in microbiology lab, food microbiology and mycology lab.</p> <p>In 2016, I got my master degree in biology/immunology and worked as assistant lecturer in practical biochemistry, practical virology, practical immunology and practical</p>

	invertebrate.
<b>9. Keywords</b>	<p><b>Theory:</b> Immunology, Haematoposis, Lymphoid Organ, Antigen, Antibody, Immune Response, Complement System, Cytokines, and Hypersensitivity.</p> <p><b>Practical:</b> blood cells, plasma, serum, immunization, agglutination, precipitation and ELISA</p>
<b>10. Course overview:</b>	<p><b>Theory:</b> Our immune system not only protects us from viruses, bacteria, and parasites, it can prevent the growth of tumors. Sometimes our immune system can be the cause of diseases like multiple sclerosis, Type 1 diabetes and rheumatoid arthritis. If you are interested in studying how our immune system works to keep us alive, then Immunology course is for you. This course of study will provide an overview of the immune system and the essential features of immune responses an introduction to the nature of the cells and molecules involved in the immune response, Phagocytosis, lymphoid organs, cells and receptors, Recognition of pathogens; antigen processing and presentation.</p> <p>The study of the immune system ultimately provides us with a fascinating insight into the relationship between animals, and the organisms that infect them (not only bacteria &amp; viruses, but also protozoans and parasites). Evolutionary science has demonstrated how the life we see around us is the product of millions and millions of years of development – and part of this process has been the development of the immune system itself, as a consequence of the long and ongoing relationship between the organisms already mentioned. There is a value, and excitement, to discovering how the immune system in different organisms works, merely for its own sake. However, understanding the immune system also gives us the potential to develop therapies that control infectious disease (this includes vaccines, of which a great many have now been developed), cancer, and other diseases resulting from the malfunction of the immune system.</p> <p><b>Practical:</b> The course covers the fundamental principles related to the practical Immunology. Included are the immune response, principles of antigen-antibody reactions, and the principles of serological. This includes performance of serological procedures used to aid in the detection or diagnosis of certain diseases.</p>
<b>11. Course objective:</b>	<p><b>Theory:</b></p> <ul style="list-style-type: none"> <li>The objective of this course is to learn about the Immunity, Types of immunity, Subject and immunology tasks, History and development of immunology, Hematopoiesis- Localization of hematopoiesis, Innate Immunity (Innate immunity-Factor influencing level of innate immunity-Mechanism of innate immunity-Humoral factor-Cellular factor-Mode of intracellular killing), and Acquired Immunity (Acquired Immunity- Active immunity-Passive immunity-Difference between active and passive immunity). Localization of the immune system in the body and Lymphoid Organ [Lymphoid Organ-A/Primary lymphoid tissue (Bone marrow-Bursa of fabricius-Thymus) B- S(Johnson &amp; Clarke, 2005)econdary</li> </ul>

lymphoid tissue (Lymphatic circulation-Lymph node-Spleen) C/Tertiary lymphoid tissue (Mucosal associated lymphoid tissue-Intraepithelial lymphocyte), Different structure and shape of immunoglobulin (Structure of Ig-Type of Ig-Function of Ig), Properties of the immunogen-Antigen presenting cell-Ag processing pathway, and Immune Response, Complement System (Definition-Function-Path way of activation –Regulation of complement activation), Source-Type-Function of cytokine, and Hypersensitivity (Anaphylactic hypersensitivity-Type 2 hypersensitivity-Immune complex hypersensitivity-Delayed hypersensitivity).

**Practical:**

- This course is intended to provide the student with a foundation in immunology and serology. Topics include the components of the immune system, basic immunoassay principles and immunologic techniques and the clinical symptoms and laboratory findings associated with diseases and disorders of the immune system in the human body.
- Serological procedures will be presented and their diagnostic significance will be emphasized.

**12. Student's obligation**

**\*Exam policy:** Student Should take 2 exam during the course There will be no make-up exams for absences students without medical report.

**\*Classroom polices:**

**1- Attendance:** You are strongly encouraged to attend class on a regular basis, as participation is important to your understanding of the material. This is your opportunity to ask questions. **You are responsible for obtaining any information you miss due to absence**

**2-Lateness:** Lateness to class is disruptive

**3-Electronic devices:** Allcell phones are to be turned off at the beginning of class and put away during the entire class.

**4-Talking:** During class please refrain from side conversations. These can be disruptive to your fellow students and your professor

**5- NoDisrespectful to both the professor and to your fellow students.**

**13. Forms of teaching**

**Face-to-Face (Lectures and PowerPoint)**

**14. Assessment scheme**

Component	Date	Percent
Theory Exam 1 Dr.Taban Rasheed	00/00/2023	15%
Practical exam Sonia Ishaq	00/00/2023	35%
Total		50%

### 15. Student learning outcome:

**Theory:**After completion of this course, you will be able to:

- Define common terms used in immunology and the history of immunology.
- Localization of the immune system in the body
- Different structure and shape of immunoglobulin
- Analyze serological test as a tool for diagnosis of different human disease.
- Difference between active and passive immunity
- Properties of the immunogen-Antigen presenting cell-Ag processing pathway
- Structure of Ig-Type of Ig-Function of Ig
- Mechanism of immune response-Primary and secondary immune response.
- Complement System (Definition-Function-Path way of activation –Regulation of complement activation)
- Source-Type-Function of cytokine
- Anaphylactic hypersensitivity-Type 2 hypersensitivity-Immune complex hypersensitivity-Delayed hypersensitivity

**Practical:** After completion of this course, you will be able to:

- Describe the concepts of nonspecific and specific immunity.
- State the principle of the routine serologic procedures performed in the clinical laboratory.
- Read and correctly follow instructions provided in reagent package inserts, as needed, to obtain valid results.
- Evaluate specimen acceptability.
- Evaluate laboratory test outcomes and determine the validity of the test results obtained.
- Evaluate and correlate test results with associated diseases or conditions.
- Recognize the limitations of each laboratory procedure performed and describe how these may affect the results of the testing performed

### 16. Course Reading List and References:

#### Theory

- Ivan Roitt,I. Brostoff,J. and Male,D. (2002) Immunology (6<sup>th</sup> Ed.) Ediburgh, Mosby.
- Parslow,T.G. , Stites,D.P. , Terr,A.I. , Imboden,J.B. (2001) Medical Immunology(10<sup>th</sup> Ed.) NY, McGraw Hill
- Brooks, G.F., Carroll, K.C., Butel, J.S. &Morse, S.A. (2007) Medical Microbiology (24<sup>th</sup> Ed.) NY, McGraw Hill.

#### Practical

- Baker, F. J., & Silverton, R. E. (2014). Introduction to medical laboratory technology: Butterworth-Heinemann.
- Johnson, A. G., & Clarke, B. L. (2005). High-yield immunology: Lippincott Williams &

Wilkins.	
<b>17. Theory Topics:</b>	<b>2 hr./week</b>
Basic Immunology (Immunology-Hematopoiesis-Localization of hematopoiesis)	00/01/2024
Innate Immunity (Innate immunity-Factor influencing level of innate immunity-Mechanism of innate immunity-Humoral factor-Cellular factor-Mode of intracellular killing).	00/01/2024
Acquired Immunity (Acquired Immunity-Active immunity-Passive immunity-Difference between active and passive immunity).	00/01/2024
Lymphoid Organ A/Primary lymphoid tissue (Bone marrow-Bursa of fabricius-Thymus)	00/01/2024
B/Secondary lymphoid tissue (Lymphatic circulation-Lymph node-Spleen) C/Tertiary lymphoid tissue (Mucosal associated lymphoid tissue-Intraepithelial lymphocyte).	00/02/2024
Antigen Processing and Presentation (Properties of the immunogen-Antigen presenting cell-Ag processing pathway).	00/02/2024
Immune response (Mechanism of immune response-Primary and secondary immune response)	00/02/2024
Immunoglobulin (Structure of Ig-Type of Ig-Function of Ig)	00/02/2024
Complement System (Definition-Function-Path way of activation – Regulation of complement activation).	00/03/2024
Cytokines Source and Types	00/03/2024
Function of cytokine	00/03/2024
Hypersensitivity /Anaphylactic hypersensitivity- Type I Hypersensitivity	00/04/2024
Type 2 hypersensitivity-Immune complex hypersensitivity-Delayed hypersensitivity.	00/04/2024
<b>18. Practical Topics</b>	<b>2hr./week</b>
Introduction to Immunology/ General concepts	00/01/2024
Bactericidal power of normal serum	00/01/2024
Marking, Injecting and bleeding of animals (rabbit)	00/01/2024
Clearance of blood by reticuloendothelial system(Role of innate immunity)	00/01/2024
Preparation of immunization agent	00/02/2024

ABO system and compatibility test (cross-matching test)	00/02/2024
Anti-Streptolysin O test (ASO test)	00/02/2024
C- reactive protein test and Rheumatoid factor	00/02/2024
Bacterial Agglutination(Widal-test and Rose Bengal test )	00/03/2024
H. Pylori test	00/03/2024
Pregnancy test	00/03/2024
VDRL & TPHA	00/03/2024
Enzyme Linked Immunosorbent Assay (ELISA)	00/04/2024
Examination	00/04/2024

### **19. Examinations: Some samples of questions**

#### **1. Compositional(Explain), True or false type of exams, Multiple choices, and Fill the blanks**

##### **Q1/ Define**

1. T-dependent Antigen
2. C4b binding protein
3. Diageorge Syndrome
4. Secondary immune response

##### **Q2/ Fill in the blanks**

- 1- Precursor T cells must migrate to thymus where they undergo differentiation into two type of T cells \_\_\_\_\_ and \_\_\_\_\_.
- 2-Chemotactic factor for attracting phagocytic cells to site of inflammation includes \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- 3- Fixation of first complement (C1) needed for immune complex and binding with Ig requires \_\_\_\_\_ and \_\_\_\_\_ ions.
- 4- \_\_\_\_\_ blocks the association of factor-B complement with C3b in alternative pathway.
- 5- NK cells are capable of killing \_\_\_\_\_ and \_\_\_\_\_ cells.
- 6- IgA has a \_\_\_\_\_ which made in \_\_\_\_\_ cells as its passes into secretions.
- 7- Thymic nurse cells secreted \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ hormones to promote maturation of T cell in thymus.

**Q3/** Explain with drawing the early events in Antibody production in lymph node.

**Q4/** Explain

A- The classical pathway for complement activation.

B- Detoxification reaction in PMN and Macrophage.

**Q5/** explain the oxygen dependant mechanism of killing by phagocyte cell

**Q/6** show by a diagram the effect of some cytokines on the response between NK cell, Macrophage, and T cell

**Q/7** Describe this statement (T cell activation, eosinophil inflammation)

**Q/8** choose the correct answer(s)

- 1- Found (s) in chronic inflammations
- 2- Inhibit (s) one arm of Arachidonic acid pathway
- 3- Increase (s) blood vessel constriction
- 4- Cause (s) MAC production
- 5- Cytokine (s) that cause production of IgE
- 6- Cytokine (s) that has role in killing parasite
- 7- Cytokine (s) that cause production of IgA
- 8- Example (s) Of Anti-inflammatory cytokines

(IL-10, C9, IL-5, IL-4, TNF- $\alpha$ , IgG, IL-2, C5b6789, IgM, fibroblast, C5b6789(n), MBL, neutrophilia, macrophage, C5a, paracetamole, Prostaglandin, C5b67, granuloma, NSAID, none of them)

**Good Luck/Dr.Taban Rasheed**

### **Practical Examination**

**Q9/** Answer the following?

- 1- Why newborn blood is only forward typed?
- 2- Why sometime the blood of fetus become hemolysis?
- 3- What is the perfect test (immunological aspect) use for the diagnosis of H.pylori and why?

**Q10/** Fill the following blanks:

- 1- Precipitation reaction can be converted into agglutination reaction by coating soluble antigen onto-----.
- 2- The normal range of ASO is-----.



3- The unheated serum kills bacteria by ----- pathway.

**Good Luck/ Sonia E. Ishaq**

### **20. Extra notes:**

We want to be supportive to everyone. This "Course Book" will help you understand how College of Science/Biology Department environment works, what to do first, and who to contact if you need help. We appreciate the participation and sharing from all students related to classroom activities for the first time.

Whenever you have some questions or concerns about virology and the course book, ask any questions you may have about your concern. Sometimes a quick question at time can save a lot of frustration later!

Our discussion goal in the classroom is to be collaborative, not combative. This is important to your success in the course and as a professional. Experience shows that even an innocent remark in the class environment can be easily misconstrued. Please re-think your responses carefully before you react with others in order not to be conceder as personal attacks. Be positive to others and diplomatic with your words. We will try our best to do the same. Be careful when using sarcasm and humour. Without face-to-face communications your joke may be viewed as criticism. Remember you are not competing with each other for grades, but sharing information and learning from one another.

The College of Science, Department of Biology, expects that all students exhibit professional behaviour.

### **21. Peer review**

We have read this course book and we see that it is contains the most necessary subjects

**Dr.Taban K.Rasheed.**