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**Department of : MLT**

**College of Health Technical**

**University of : Erbil polytechnic university**

**Subject: Clinical Hematology and Blood banking**

**Course Book – (4th year )**

**Lecturer's name: Dr. Mudhir S. Shekha**

**Academic Year: 2020/2021**

**Course Book**

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| **1. Course name** | | **Clinical Hematology** | | |
| **2. Lecturer in charge** | | **Dr. Mudhir S. Shekha** | | |
| **3. Department/ College** | | **MLT/ College of Health Technical** | | |
| **4. Contact** | | [**Mudhir.shekha@su.edu.krd**](mailto:Mudhir.shekha@su.edu.krd)  **Tel: 009647803616628** | | |
| **5. Time (in hours) per week** | | **Theory: 1**  **Practical: 8** | | |
| **6. Office hours** | | **Availability of the lecturer to the student during the week 8hr.** | | |
| **7. Course code** | |  | | |
| **8. Teacher's academic profile** | | Name Mudhir S. Shekha  Title Assistant professor in Physiology  Date of Birth 06-09-1977 - Erbil/ Kurdistan Region Government/Iraq  Education  1996-2000 B.Sc in Biology  Department of Biology / College of Science/ University of Salahaddin/ Erbil-KRG/Iraq  2001-2003 M.Sc in Physiology  Department of Biology / College of Science/ University of Salahaddin/Erbil-KRG/Iraq  2003-2007 Lecturer in Department of Biology    2007-2010 Ph.D in physiology  Department of Biology / College of Education/ University of Duhok/ Duhok-KRG/Iraq  2010- 2020 Lecturer in the Department of Biology / College of Science/ University of Salahaddin/Erbil-KRG/ Iraq  2015-2020 Director of Tissue culture and cell Biology Lab Salahaddin University Research Centre/Iraq  2016-2020 Director of Seminar and workshop committee in Salahaddin University Research Centre/Iraq  **Paper Publication**   1. Govand Qadir, Mukhlis Aali, Karwan M Amen, Kazhan Mahmood, Bestoon Hasan, **Mudhir Shekha**, 2020. Dara K Mohammad, Hastyar H Najmuldeen, Dler Mahmood, Farhang Awla, Karzan Mohammed, Abbas Salihi. The Status of Cancer Publications in the Kurdistan Region of Iraq. Journal of Cancer Policy (Scopus **Citescore=0.95**) 2. Majid Sharifi, Sara Haji Hosseinali, Reza Hossein Alizadeh, Anwarul Hasan, Farnoosh Attar, Abbas Salihi, **Mudhir Sabir Shekha**, Karwan M Amen, Falah Mohammad Aziz, Ali Akbar Saboury, Keivan Akhtari, Akbar Taghizadeh, Nasrin Hooshmand, Mostafa A El-Sayed, Mojtaba Falahati. 2020. Plasmonic and chiroplasmonic nanobiosensors based on gold nanoparticles. Talanta. (**IF: 4.916**) 3. Majid Sharifi, Sara Haji Hosseinali, Pedram Yousefvand, Abbas Salihi, Mudhir Sabir Shekha, Falah Mohammad Aziz, Amir JouyaTalaei, Anwarul Hasan, Mojtaba Falahati. 2019. Gold nanozyme: Biosensing and therapeutic activities. Materials Science and Engineering: C (**IF: 4.959**) 4. Mohammad Javad Sohrabi, Ahmad-Reza Dehpour, Farnoosh Attar, Anwarul Hasan, Nahid Mohammad-Sadeghi, Ali Akbar Meratan, Falah Mohammad Aziz, Abbas Salihi, **Mudhir Sabir Shekha**, Keivan Akhtari, Koorosh Shahpasand, Seyed Mohammad Masood Hojjati, Majid Sharifi, Ali Akbar Saboury, Seyed Mahdi Rezayat, Seyyedeh Elaheh Mousavi, Mojtaba Falahati. 2019. Silymarin-albumin nanoplex: preparation and its potential application as an antioxidant in nervous system in vitro and in vivo. International Journal of Pharmaceutics. **(IF=4.213)** 5. Majid Sharifi, Kousar Faryabi, Amir Jouya Talaei, **Mudhir Sabir Shekha**, Mahsa Ale-Ebrahim, Abbas Salihi, Nadir Mustafa Qadir Nanakali, Falah Mohammad Aziz, Behnam Rasti, Anwarul Hasan, Mojtaba Falahati. 2019. Antioxidant properties of gold nanozyme: A review. Journal of Molecular Liquids. Volume 296, 111839. **(IF=4.561)** 6. Seyedeh Zahra Khoshgozaran Roudbaneha, Sepideh Kahbasi,Mohammad Javad Sohrabi, Anwarul Hasan, Abbas Salihi, Amir Mirzaie, Ali Niyazmandh, Nadir Mustafa Qadir Nanakali, **Mudhir Sabir Shekha**. ,Falah Mohammad Aziz, Gholamreza Vaghar-Lahijani, Aliasghar Bagheri Keshtali, Ehsan Ehsani, Behnam Rasti, Mojtaba Falahati. 2019. Albumin binding, antioxidant and antibacterial effects of cerium oxide nanoparticles. Journal of Molecular Liquids. Volume 296, 111839. **(IF=4.561)** 7. Niusha Abbasi Gamasaee, Hawzheen A Muhammad, Elahe Tadayon, Mahsa Ale-Ebrahim, Mirsasan Mirpour, Majid sharifi, Abbas Salihi, **Mudhir Sabir Shekha**, Asaad A.B. Alasady, Falah Mohammad Aziz, Keivan Akhtari, Anwarul Hasan & Mojtaba Falahati. The Effects of Nickel Oxide Nanoparticles on Structural Changes, Heme Degradation, Aggregation of Hemoglobin and Expression of Apoptotic Genes in Lymphocyte Cells. Journal of Biomolecular Structure and Dynamics. Taylor & Francis. P 1-15. **(IF=3.310)** 8. Francesco Moccia, Sharon Negri, **Mudhir Shekha**, Pawan Faris and Germano Guerra. 2019. Endothelial Ca2+ Signaling, Angiogenesis and Vasculogenesis: Just What It Takes to Make a Blood Vessel. International Journal of Molecular Sciences. 20, 3962. **(IF=4.331)** 9. Chnar Najmaddin, Fouad Hussein Kame, **Mudhir Sabir Shekha** and Falah Mohammad Aziz. 2019. Developed Silver Nitrate Pigment for Plant, Animal Tissue and Bacterial Staining. The Journal of Research on the Lepidoptera Volume 50 (2): 196-202. **(Scopus)** 10. Pawan Faris, Giorgia Pellavio, Federica Ferulli, Francesca Di Nezza, **Mudhir Shekha**, Dmitry Lim, Marcello Maestri, Germano Guerra, Luigi Ambrosone, Paolo Pedrazzoli, Umberto Laforenza, Daniela Montagna and Francesco Moccia. Nicotinic Acid Adenine Dinucleotide Phosphate (NAADP) Induces Intracellular Ca2+ Release through the Two-Pore Channel TPC1 in Metastatic Colorectal Cancer Cells. Cancers **2019**, 11(4), 542. **(IF=6.162)** 11. Pawan Faris, **Mudhir Shekha**, Daniela Montagna, Germano Guerra, Francesco Moccia. (2019). Endolysosomal Ca2+ Signalling and Cancer Hallmarks: Two-Pore Channels on the Move, TRPML1 Lags Behind!. Cancers **2019**, 11(1), 27; <https://doi.org/10.3390/cancers11010027>. **(IF=6.162)** 12. **Mudhir S. Shekha** and Almas M.R. Mahmud. (2017). Protective Effect of Exercise and alpha-tocopherol on atherosclerosis promotion in hypercholesterolemic domestic rabbits. AIP Conference Proceedings, 1888, 020049; 1-10. (**Scopus)** 13. Abbas B. Q. Salihi1, **Mudhir S. Shekha**, Peshraw S. Hamadamin, Ismail M. Maulood, Khder H. Rasul, Muhammed A. Salim, Fikry A. Qadir, Goran Q. Othman, Almas M. R. Mahmud, and Omar A. M. Al-Habib. (2017). In vivo cardiac electrical activity of nitric oxide in barium chloride treated male rats. AIP Conference Proceedings 1888, 020048.1-8 **(Scopus)** 14. **Mudhir S. Shekha**, Muhsin J. Abulwahid, Peshraw S.Hamadamin, Trifa F. Ismail, Saman R. Hamad bakir, Laween M. Ibrahim and Lana M. Ahmed. (2017). Curative effects of pomegranate and ginger on hepatic and renal functions of indomethacin-induced peptic ulcers in albino rats. Journal University of Zakho, Vol 5 No 1. 48-52 15. **Mudhir S. Shekha**, Abbas A. Q. Salihi, Ismail M. Moulood, Almas M. R. Mahmud. (2017). Roles of magnesium ion in vascular relaxation via calcium channel and cyclooxygenase pathway in isolated rat aorta. ZANCO Journal of Pure and Applied Sciences, Vol 29, No 3. 55-61. 16. Abbas A. Q. Salihi, **Mudhir S. Shekha**, Ismail M. Moulood, Almas M. R. Mahmud and Omer A. M. Al-Habib. (2016). Nitric Oxide Donor Dilates Aorta in Salt Loaded Rats Via Ativation of Inward Rectifier Potassium Channels. ZANCO Journal of Pure and Applied Sciences. ZJPAS, 28 (5); 69-77 17. Abbas B.Q. Salihi, **Mudhir S. Shekha**, Omar A.M. Al-Habib. Vasodilatory effects of nitric oxide, hydrogen sulfide and sulfur dioxide in rats: Time-dependent interaction study. Progress in Biological Sciences. Vol. 6, Number 1, Winter / Spring 2016/19-30. 18. Farhang Ali Awla, Almas Muhamad Rashid Mahmud, **Mudhir Sabir Shekha**. 2015. The Role of Endothelium-Derived Relaxing Factor in The Regulation of SNP Induced Vasorelaxation: Sodiumpotassium-Chloride Cotransporter. Journal University of Zakho, Vol. 3(A) , No.2, Pp 164-170. 19. **Mudhir Sabir Shekha**, Trifa F. Ismail, Falah M. Aziz: (2015) *Anti-Urolithiatic and anti-inflamationeffect of Fenugreek in Ethylene Glycol-Induced Kidney Calculi in Rat*. Volume 8, Number 2. Jordan Journal of Biological Sciences 20. Abbas B.Q. Salihi, **Mudhir S. Shekha**, Omar A.M. Al-Habib: *PP13. Time-dependent interaction between hydrogen sulfide, nitric oxide and sulfur dioxide in the relation of rat aorta*. Nitric Oxide 05/2015; 47:S18-S19. DOI:10.1016/j.niox.2015.02.043 21. **Mudhir Sabir Shekha**: (2014) *vasorelaxant and antispasmodic effects of some polyphenols and glycoside in rat smooth muscles*. Vol. 2(A), No.2, Pp 220-227, Journal of University of Zakho, 22. **Mudhir S. Shekha**, Abbas B. Qadir, Haval H. Ali, Xebat E. Selim: (2014). *Effect of Fenugreek ( Trigonella Foenum-Graecum ) on Ethylene Glycol Induced Kidney Stone in Rats*. 12/2014; 7(4):257-260. DOI:10.12816/0008248. Volume 7, Number 4. Jordan Journal of Biological Sciences. 23. **Mudhir Sabir Shekha**, Omar A M Al-Habib. (2013). *Relaxant Effects of Rutin on Rat Smooth Muscles*. Journal of University of Zakho, Vol.1, (A) No.2, Pp 139-144. 24. **Mudhir Sabir Shekha**, Abdullah O. Hassan, Safin A. Othman: (2013). *Effects Of Quran Listening And Music On Electroencephalogram Brain Waves*. 9(1): 1 – 7. Egyptian. Journal. Experimental Biology. (Zool.). 25. **Mudhir S Shekha**, Omar A M Al-Habib: (2011). *Vasorelaxant, antispasmodic and Cardiotonic effect of the Chloroform Fraction of Crataegus aronia on isolated rat muscles*. International Journal of Biological and Biomedical Sciences. Vo. 1, No. 1, PP. 06-011 26. **Mudhir Sabir Shekha**, Omer A.M AL-habib: *Physiological Effects of Crataegus aronia Fractions on Isolated Smooth Muscles in Albino Rats*. P 122-130. Conference Proceeding’s Book, The Third International Conference for Medical Sciences, 24- 26 October 2012 27. Omar A. M Al-Habib, **Mudhir Sabir Shekha**: (2010). *Vasorelaxant Effect of Aqueous Extract of Crataegus Azarolus Aronia and Quercetin on Isolated Albino Rat's Thoracic Aorta*. *Journal of Duhok* .Vol. 13, No. 1 28. Abbas Burhan Qadir Salihi, **Mudhir Sabir Shekha**, Shahid Salahaddin Omer: (2010). *Effects of Ginkgo Biloba and Α-Tocopherol on CCl4- Induced Liver Fibrosis and Thrombosis in Male Albino Rats*. *Journal of Duhok* Vol. 13, No. 1 29. **Mudhir Sabir Shekha**, Karzan T. Sabir, Hiwa R. Fatah: (2009). *protective influence of vitamin c & piracetam on blood parameters of rats treated with cadmium*. *Journal of Duhok* . Vol. 12, No. 1 30. **Mudhir Sabir Shekha**: (2008). *The Effects of Rhubarb Root and Antihyperlipidemic Drug On Some Physiological Parameters In Male Rats*. *Journalof Duhok* . Vol. 11, No. 1 31. Mustafa Sabir Al-attar, **Mudhir Sabir Shekha**: (2006). *The Prevalence of Thalassemia in Erbil Province*. *Zanko Journal* Vol. 18, No. 3 32. **Mudhir Sabir Shekha**, Almas Mohammad, Rasheed Mahmood. (2005). *The effects of exercise and vitamin E on some haematological values in immature male domestic rabbits. Zanko Journal.* Vol. 17, No. 1 | | |
| **9. Keywords: Hematopoiesis, , Hemoglobin, Hemostasis,** | | | | |
| **10. Course overview:**   * Hematology is the study of blood cells in normal and abnormal conditions. Students will be instructed in the theory and practical application of hematology procedures, including quality control, quality assurance, safety, manual and/or automated methods as well as blood cell maturation sequences, and normal and abnormal morphology with associated disease. | | | | |
| **11. Course objective:**    By the end of this course the student should be able to:   * + Describe the structure and function of the components of normal blood and bone marrow.   + Demonstrate proficiency in the skills necessary to perform blood cell counts, and evaluation of blood elements within stated limits of accuracy.   + Describe the pathological processes that occur in the blood and bone marrow.   + Determine suitability of hematology specimens and dispose of them in the appropriate biohazard containers.   + Describe the normal and abnormal events during hemostasis. | | | | |
| * **12. Student's obligation**   Attendance:   * Students are expected to attend all scheduled classes arrive on time and remain in class until dismissed. Delay and early departure are disruptive for students and the teacher and are unacceptable; Attendance will be recorded daily per university policy. Students arriving five minutes late will be marked as absent students leaving before the completion of class may also maybe marked as absent | | | | |
| **13. Forms of teaching**  • All lectures will present in lecture hall using power point presentations.  • Student will get a hard copy & soft copy of the lecture a week before starting the new topic. This will give the student an idea about the new topic also make the student participates with the tutor.  • Always start my lecture with a summary of the content rather than a discussion of previous lecture.  • Students are more receptive in the first and last few minutes of the lecture. So these are the times to emphasize the key points of the lecture.  • Tutor will use all available facilities such data show, white board, charts and others. | | | | |
| **14. Assessment scheme**  • Mid semester Examination (40% marks) including report, quiz, presentation and student activities.  • Final semester examination (60% marks). | | | | |
| **15. Student learning outcome:**   * Differentiate various hematological procedures and the use of basic equipment essential to working in a Clinical Hematology Laboratory * Discuss differences between Quality control, Quality Assurance, and Continuing Quality Improvement principles as used in the Hematology Laboratory. * Categorize various hematology analyses, operational principles of various hematology instruments, and troubleshooting of various instruments. * Explain the principles and theories utilized in a variety of problem-solving situations. * Differentiate various laboratory test findings with their associated clinical conditions. * Identify the various skills necessary to perform blood counts, evaluate blood elements and report results within the stated limits of accuracy. * Describe the various components of blood, their functions and roles in various disease states. * Know OSHA safety regulations for blood borne pathogens. * Define testing suitability standards for Hematology specimens. | | | | |
| **16. Course Reading List and References‌:**  1- Ronald Hoffman. Hematology . Basic Principles and Practice, 6th Edition 2012  2- Lichtman. Lichtman’s Atlas of Hemataology , 2016  3- Rodak. Hematology, 5th Edition, 2015  4- R. Hoffman Hematology, 4th Ed, 2005.  5- 1- Dacie and Lewis Practical Haematology, 12th Edition, 2016  In addition: Many excellent reviews covering current knowledge/areas of active research are available on the internet. Pub Med (National Centre for Biotechnology Information) http://www.ncbi.nlm.nih.gov/ | | | | |
| **17. The Topics: (Theory)** | | | |
| |  |  |  | | --- | --- | --- | | The Schedule | | | | Topic | Hours | Week | | Blood Disorders, Red Blood Disorders | 6 | 1 | | Anaemias, Iron-Deficiency Anemia | 6 | 2 | | Aplastic Anemia, Hemolytic anemia, | 6 | 3 | | Hereditary Spherocytosis, G6PD Deficiency (favism), | 6 | 4 | | Sickle Cell Anemia, Polycythemia | 6 | 5 | | Thalassemia, Alpha- thalassemia | 6 | 6 | | Beta- thalassemia | 6 | 7 | | Mid Term Examination | 6 | 8 | | Leukemia, Acute myelocytic leukemia, | 6 | 9 | | Chronic myeloid leukemia, | 6 | 10 | | Chronic Lymphocytic Leukemia, | 6 | 11 | | Acute lymphoblastic leukemia | 6 | 12 | | Platelet Disorder | 6 | 13 | | **Blood Banking** | | | | **Introduction** | | | 1 | | **Fundamentals of Immunology for Blood Bankers** | | | 2 | | **Collection and storage of blood** | | | 3 | | **Blood group system** | | | 4 | | **Blood components and plasma derivatives** | | | 5 | | **Compatibility** | | | 6 | | **Midterm Exam** | | | 7 | | **Blood transfusions and the immune system** | | | 8 | | **Appropriateness and inappropriateness of blood transfusion** | | | 9 | | **Hemolytic disease of Newborn (HDN)** | | | 10 | | **Blood transfusions and the body reaction** | | | 11 | | **Quality Control** | | | 12 | | **Final Exam** | | | 13 | | | | |
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| **18. Practical Topics** | | |  | |
| **Week** | Topics | | | |
| Week 1 | Introduction to basic concepts in practical hematology lab | | | |
| Week 2 | HEMATOCRIT | | | |
| Week 3 | DETERMINATION OF HEMOGLOBIN CONCENTRATION | | | |
| Week 4 | RED BLOOD CELL COUNT | | | |
| Week 5 | WHITE BLOOD CELL COUNT | | | |
| Week 6 | PREPARATION OF THE BLOOD SMEAR | | | |
| Week 7 | DIFFERENTIAL LEUKOCYTE COUNT ( DLC) | | | |
| Week 8 | MIDTERM | | | |
| Week 9 | PLATELETS COUNT | | | |
| Week 10 | BLOOD GROUP DETECTION | | | |
| Week 11 | BLEEDING TIME AND CLOTTING TIME | | | |
| Week 12 | ERYTHROCYTE SEDIMENTATION RATE | | | |
| Week 13 | RETICULOCYTE COUNT | | | |
| Topics | | | | |
| **Introduction to basic concepts in practical blood banking lab** | | | | |
| **BLOOD COLLECTION** | | | | |
| **STORAGE AND PRESERVATION OF BLOOD** | | | | |
| **TRANSPORTATION OF BLOOD** | | | | |
| **BLOOD GROUP SYSTEM** | | | | |
| **RH BLOOD GROUPING** | | | | |
| **MIDTERM EXAM** | | | | |
| **COMB'S TEST OR ANTIGLOBIN TEST** | | | | |
| **COMPATIBILITY TESTING OR CROSS MATCHING** | | | | |
| **BLOOD TRANSFUSION REACTIONS** | | | | |
| **ANTI RH ANTIBODY TITER** | | | | |
| **PREPARATION OF BLOOD COMPONENTS** | | | | |
| **FINAL EXAM** | | | | |

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