MEDICAL UNIVERSITY OF PLOVDIV

MEDICAL FACULTY

==========

FIRST DEPARTMENT OF INTERNAL MEDICINE

SECTION OF HEMATOLOGY

SYLLABUS

IN

HEMATOLOGY

Approved by the Department Council – Protocol №3/06.07.2022

Confirmed by the Faculty Council - Protocol №7/13.07.2022

MEDICAL UNIVERSITY - PLOVDIV
MEDICAL FACULTY

Education Plan

Discipline	Final exam/ semester	Auditorium classes				ECTS non-auditorium classes	ECTS total	Academic hours in years and semesters	
								4-th year	
		Total	Lectures	Practices	ECTS			I	II
Hematology	VIII	210	60	150	10.0*	5.3*	15.3*	105	105

***For the whole module "Internal Medicine-I"**

Name of the discipline:
"Hematology"

Type of discipline:
Mandatory

Level of training:
Master / M /

Forms of training:
Lectures, clinical practice, seminars, self-preparation.

Duration of training:
One semester

Chorary:
30 hours of lectures, 75 hours of clinical practice per semester

Teaching methods:
Multimedia Presentations, Demonstration of Patients with Blood Diseases, Self-Training with Patients, Direct and Videomonitoring Microscopy of Bone Marrow and Peripheral Blood Smears, Atlases and Clinical Albums with Own Clinical Material

Forms of assessment:
Current evaluation, tests, colloquiums, elaboration of a paper.

Formation of the assessment:
Mean of the assessments during the semester.

Assessment aspects:
Individual work with a patient, participation in seminar discussions, tests, colloquiums, elaboration of a paper.

Semester examination:
Yes / Practical Exam, Entry Test, Written Exam /

State Examination:
Yes / practical and written /

Main Lecturer: Prof Vesselina Goranova-Marinova, MD, PhD

Department:

Department of Internal Medicine -I

Section of Hematology

ANNOTATION

Clinical hematology is a medical specialty and scientific discipline of integrative nature that studies blood and haematopoietic organs in norm and pathology. It has specific methodology and therapeutic activity in the following key areas:

- Clinical hematology: benign and malignant, congenital and acquired blood disorders, as well as haematological complications in diseases of other organs and systems
- Haematological laboratory diagnosis
- Thrombosis and haemostasis
- Hematopoietic Stem Cell Transplantation
- Transfusion medicine

OBJECTIVE OF CLINICAL HEMATOLOGY

The main objective of the medical specialty "Clinical Hematology" is complex knowledge and competence of blood and hematopoietic organs in norm and pathology, provision of early diagnosis, prognosis of disease progression, adequate therapy, traceability, medical expertise, effective primary and secondary prevention and dispensary of the patients with hematological diseases

MAIN TASKS OF THE CURRICULUM PROGRAM

IN CLINICAL HEMATOLOGY

1. Acquisition of knowledge and competence of contemporary perceptions of epidemiology, etiology, pathophysiology, clinical features, diagnosis, prognosis and therapeutic approaches to inborn and acquired diseases of blood and hematopoietic organs.

2. Acquisition of knowledge, competence and practical skills for the indications and interpretetation of sensitivity, specificity and informative value of the laboratory tests in hematology: cytomorphology, immunohamatology, flow cytometry, cytogenetic analisys, molecular analysis, imaging methods for blood and haematopoietic examination in norm and pathology .

3. Acquiring knowledge, competence and practical skills for diagnosis of hematological malignancies, benign diseases of hematopoiesis, overall assessment of the coagulation system in norm and pathology, control of the clinical and biological evolution of haematological diseases, the possibility of secondary neoplasias, early and late complications of the treatment as well and the impact of occupational and environmental environments on the epidemiology of haematological diseases.

4. Knowledge and competence of the main therapeutic methods of congenital and acquired diseases of blood and blood-forming organs, behavior in emergency and life-threatening haematological conditions, control of congenital and acquired disorders of blood clotting, transplantation of hematopoietic stem cells, clinical implications of blood and blood products transfuzion and adequate management of the adverse reactions. Impact of the occupational factors and the environment on the epidemiology of haematological diseases.

COMPULSORY LEVELS OF KNOWLEDGE AND COMPETENCE OF THE CURRICULUM in CLINICAL HEMATOLOGY

1. **Theoretical knowledge**

• Major pathogenetic mechanisms of the neoplastic transformation of hematopoiesis

• Classifications, diagnostic methods, diagnostic criteria for congenital and acquired, benign and malignant diseases of blood and hematopoietic organs

• Basic principles of management and therapeutic methods of hematological malignantcies

• Basic knowledge about haemostasis and laboratory monitoring

2. Competence and practical skills

- History and physical status of a patient with haematological disease
- Laboratory minimum for diagnosis of haematological disease
- Working with an Immercial Microscope. Differential blood count.
- Blood groups and blood transfusion tests
- Interpretation of quantitative and qualitative variations in CBC and DBC;
- Interpretation of blood clotting assays
- Interpretation of cytological and cytochemical results of materials from blood, bone marrow, cerebrospinal fluid, effusions in serous cavities;
- Interpretation of tests for cellular and humoral immunity;
- Interpretation of immunochemical and immunohistochemical studies;
- Interpretation of reports from cytogenetic and molecular analyses
- Interpretation of imaging and isotope tests in haematological diseases
- Interpretation of kinetic studies of isotopically-labeled platelets, erythrocytes, circulating blood volume
- Therapeutic response to emergency conditions in haematology: severe anemic conditions, haemorrhagic diathesis, pain syndrome, hypercalcemia, hyperviscous syndrome, tumor-lysis syndrome, haemolysis in incompatible blood transfusion, anaphylactic and post-transfusion reactions, decompressive abdominal and pleural puncture.

PLAN OF THE LECTURES IN HEMATOLOGY

IV –th Course, Medicine, VII/VIII semester

№	THEME	HOURS
1.	Introduction to Clinical Hematology. Hematopoiesis. Anemia. Iron metabolism. Iron Defficiency anemia	**2**
2.	Metabolism of vit B12 and folates. Megaloblastic anemias. Hypo- and aplastic conditions. Aplastic anemia	**2**
3.	Haemolytic anemias. Inherited haemolytic anemias.	**2**
4.	Acquired haemolytic anemias. Immune, autoimmune and drug – induced immune haemolytic anemias.	**2**
5.	Malignant hematological diseases. Major Pathogenetic Mechanisms of Neoplastic Growth. Classification of malignant diseases of hematopoiesis. Acute leukemia.	**2**
6.	Myelodysplastic syndromes	**2**
7.	Chronic myeloproliferative neoplasms. Chronic myeloid leukemia Ph +. Polycythemia Vera. Essential Thrombocythaemia. Myelofibrosis.	**2**

8.	Chronic lymphoproliferative disorders. Classification. Chronic lymphocytic leukemia	**2**
9	Hodgkin's Lymphoma. Differential diagnosis of lymphoadenomegaly	**2**
10	Non-Hodgkin's lymphomas. Differential diagnosis of splenomegaly	**2**
11	Multiple myeloma. AL - amyloidosis	**2**
12	Methods for the treatment of hematological malignancies: surgical treatment, radiotherapy, chemotherapy. Target Therapy. Immunomodulators. Hematopoietic Stem cell Transplantation	**2**
13	Bleeding Disorders. Basic Laboratory Diagnostics. Congenital coagulation disorders .	**2**
14	Disroders of the platelets. Immune thrombocytopenia	**2**
15	Disseminated intravascular coagulation	**2**

Total 30 hours

THESES OF THE LECTURE COURSE IN HEMATOLOGY

Introduction to Clinical Hematology. Hematopoiesis. Anemia. Iron Metabolism. Iron Defficiency Anemia.
Investigation of patients with blood diseases. Hematopoiesis. Stages in hematopoietic development. Cell Differentiation. Distribution of cell populations. Anemia. Classification. Degrees of anemic state. Iron Metabolism. Iron deficiency anemia. Definition. Classification. Pathogenesis. Clinical features - major syndromes. Laboratory tests. Diagnostic criteria. Differential Diagnosis. Treatment. Prognosis. Anemia in Chronic Diseases.

Metabolism of Vitamin B12 and Folates. Megaloblastic anemias. Hypo- and aplastic anemias. Aplastic anemia.
Metabolism of vit B12. Metabolism of folic acid. Megaloblastic anemias. Classification. Pernicious anemia. Pathogenesis. Clinical features - major syndromes. Laboratory tests. Diagnostic criteria. Differential diagnosis. Treatment. Prognosis.
Hypo-and aplastic anemias. Pathogenesis. Classification. Aplastic anemia. Definition. Incidence. Pathogenesis. Diagnostic criteria. Differential Diagnosis Treatment. Prognosis.

Haemolytic anemias. Congenital haemolytic anemias.
General data. Mechanism of hemolysis and hemolytic laboratory panel for intravascular and extravasal haemolysis. Congenital haemolytic anemias. Membranopathic haemolytic anemias. Microspherocytosis. Clinical Features. Diagnostic criteria. Differential diagnosis. Treatment. Enzymopathic haemolytic anemias. Glucose - 6 phosphate dehydrogenase deficiency. Clinical features. Diagnostic criteria. Differential diagnosis. Treatment. Hemoglobinopathies. Structure of hemoglobin. Hemoglobinoses. Sickle Cell Anemia Clinical features. Diagnostic criteria. Differential diagnosis. Treatment. Thalassemia. Homozygous Beta – Thalassemia. Clinical Features. Diagnostic criteria. Laboratory monitoring of iron overload. Differential diagnosis. Treatment. Heterozygous beta-thalassemia.

Acquired haemolytic anemias. Immune, autoimmune and drug-induced immune haemolytic anemias. General data. Pathogenesis of the immune hemolytic process. Haemolytic disease of the newborn. Key mechanisms. Clinical manifestation. Diagnostic criteria. Differential diagnosis. Treatment. Prophylaxis. Post-transfusion haemolytic anemias. Autoimmune haemolytic anemias. Overall characteristic of cold and heat agglutinines. Autoimmune hemolytic anemia with warm antibodies. Clinical features. Diagnosis Treatment Autoimmune hemolytic anemia with cold antibodies. Cold Agglutinine disease. Clinical Features. Diagnosis. Treatment Indications for blood transfusion in autoimmune haemolytic anemias. Drug - induced immune haemolytic anemias

Malignant Diseases of the Blood and Hematopoietic organs. Major Pathogenetic Mechanisms of Neoplastic Growth. Classification of malignant diseases of the blood and hematopiestic organs. Acute leukemias. Mechanisms of neoplastic growth (oncogenesis). Classification of hematological malignancies. Acute myeloblastic leukemia. Classification. Risk Factors. Clinical manifestation. Diagnostic methods and diagnostic criteria. Differential diagnosis. Principles of treatment, treatment phases, therapeutic response. Prognosis. Acute lymphoblastic leukemia. Principal differences from myeloblastic leukemias. Classification. Clinical manifestiation. Diagnostic methods and diagnostic criteria. Differential diagnosis. Prognostic factors. Principles of treatment, treatment phases, therapeutic response. Prognosis.

Subacute myeloproliferative disorders - myelodysplastic syndromes Definition. Pathogenesis. Classification. Clinical manifestation. Diagnostic methods and diagnostic criteria. Differential diagnosis. Prognostic factors. Principles of therapy, therapeutic response, prognosis.

Myeloproliferative Neoplasms. Chronic myeloid leukemia, Ph +. Polycythemia Vera. Essential thrombocythaemia. Primary myelofibrosis General characteristic. Classification. Chronic myeloid leukemia Ph +. Pathogenesis. Clinical features. Phases of the disease. Diagnostic methods and diagnostic criteria. Differential diagnosis. Prognostic factors Contemporary treatment. Tyrosine kinase inhibitors Therapeutic Response and Monitoring. Polycythemia vera. Pathogenesis. Clinics. Phases of the disease. Diagnostic methods and diagnostic criteria. Differential diagnosis. Prognostic Factors. Treatment. Prognosis. Essential Thrombocythaemia. Pathogenesis. Clinics. Phases of the disease. Diagnostic methods and diagnostic criteria. Differential diagnosis. Prognostic Factors Treatment. Prognosis. Primary Myelofibrosis Pathogenesis. Clinics. Phases of the disease. Diagnostic methods and diagnostic criteria. Differential diagnosis. Prognostic Factors Treatment. Prognosis.

Non-Hodgkin's Lymphomas. Classification. Common data on lymphopoiesis and diagnostic methods of lymphoproliferative diseases. T-lymphocytes. B-lymphocytes. Natural killer cells. Chronic lymphocytic leukemia. Definition. Etiology. Pathogenesis. Clinic Staging Systems for CLL. Diagnostic criteria. Differential Diagnosis. Transformation. Treatment Monoclonal Antibodies Prognosis.

Non-Hodgkin's lymphomas. Classification. Definition. Pathogenesis. Cellular origin Histological variants. Immunohistochemical and flow cytometric panels.Ann Arbor Staging system. Clinic Prognostic Systems. Methods for Diagnosis and Staging. Differential diagnosis. Treatment. Prognosis. Follicular Lymphoma. Diffuse B-Large Cell Lymphoma. Lymphoplasmocytic lymphoma. Hairy Cell Leukemia. MALT - lymphomas. Mantle cell lymphoma.

Hodgkin's Lymphoma. Definition. Pathogenesis. Cellular origin Histological variants.Ann-Arbor Staging system. Clinical manifetstion. Prognostic Factors. Methods for Diagnosis and Staging. Differential diagnosis. Treatment. Prognosis.

Plasma Cell Neoplasms. **Multiple myeloma. AL-amyloidosis**. Definition Monoclonal immunoglobulins (paraproteins) Diagnostic methods. Multiple Myeloma. Definition Pathogenesis. Staging systems Durie & Salmon and International Staging System. Clinical manifestation - Major Syndromes. Prognostic Systems. Diagnostic Criteria. Differential diagnosis. Treatment. Prognosis. Light chain deposition disease. Definition. Pathogenesis Clinical manifestation. Diagnostic criteria Differential diagnosis. Treatment. AL-Amyloidosis. Definition. Pathogenesis. Clinical manifestation. Diagnostic criteria. Differential diagnosis. Treatment

Principles of therapy of hematological malignancies: surgical treatment, radiotherapy, chemotherapy. Cytostatics. Target therapy. Immunomodulators. Hematopoietic stem cell Transplantation. Surgical methods - Indications. Radiotherapy - Indications Cytostatics. Classification. Mechanism of action. Side effects. Target therapy. Mechanism of action. Classification. Deffinitions of Therapeutic response. Hematopoietic stem cell transplantation. Autologous – SCT. Methodology. Indications. Disadvantages of the method. Allogeneic - SCT Methodology. Indications. Disadvantages of the method .Side effects . Therapeutic response Post-transplantation monitoring.

Hemostasis. Bleeding diatheses. Mechanisms of hemostasis. Laboratory diagnostics, clotting assays. Congenital bleeding disorders (coagulopathies). Definition. Classification. Clinical Characteristics of haemorrhagic diathesis. Hemophilia A and Hemophilia B. Pathogenesis. Clinical manifestation. Classification. Diagnostic criteria Prenatal diagnosis. Treatment. Prophylactic strategy. Treatment of Haemophilia with Inhibitors. Von Villebrand's disease. Definition Pathogenesis Clinic Classification Diagnostic criteria Treatment

Thrombocytopathies and thrombocytopenias. Classification. Thrombocytopathies Definition. Classification. Hemostasis laboarotory tests. Clinical manifestation. Treatment. Immune thrombocytopenia (ITP) . Pathogenesis. Clinical manifestation. Diagnostic Criteria. Treatment Spplenectomy. Thrombopoietin receptor agonists. Hemostatis in Surgical Interventions. Management of ITP in Pregnancy

Disseminated intravascular coagulation. Definition. Ethiopathogenesis. Phases. Clinical manifestation. Clinical forms. Diagnostic criteria. Differential diagnosis. Treatment Monitoring.

PROGRAM
FOR CLINICAL PRACTICE IN HEMATOLOGY
STUDENTS IV-th MEDICAL COURSE, VII/VIII SEMESTER
Horarium 75 hours / semester

WEEK	CLINICAL PRACTICE - THEMES	HOURS

Week 1	Methods for examination of a hematological patient	3
	Erythrocyte series - cytogenesis, morphology, function	2
Week 2	Iron deficiency anemia	3
	Megaloblastic anemia	2
Week 3	Congenital hemolytic anemias - Membranopathic and Enzymopenic	3
	Congenital haemolytic anemias - Thalassemia and Sickle cell anemia	2
Week 4	Acquired haemolytic anemias - isoimmune, autoimmune.	3
	Bone marrow failure. Aplastic anemia. Stem cell transplantation	2
Week 5	Test "Anemia". Transfusion of blood and blood products.	3
	Granulocyte series - cytogenesis, cytochemistry, morphology	2
Week 6	Acute myeloid leukemia- classification, clinic, diagnosis.	3
	Acute myeloid leukemia - treatment	2
Week 7	Myelodysplastic syndromes	3
	MPNs. Chronic Myeloid Leukemia, Ph+	2
Week 8	MPNs. Polycythemia vera, essential thrombocytemia, myelofibrosis	3
	Test "Myeloid malignancies"	2
Week 9	Therapeutic methods of hematological malignancies.	3
	Lymphocyte series - cytogenesis, cytochemistry, morphology, function	2
Week 10	Acute lymphoblastic leukemia	3
	Hodgkin's lymphoma - diagnosis, staging, clinics, treatment	2
Week 11	Chronic lymphocytic leukemia	3
	NHL - Indolent	2
Week 12	NHL - Aggressive	3
	Multiple myeloma	2
Week 13	AL-amyloidosis	3
	Test "lymphoproliferative disorders"	2
Week 14	Hemostasis. Disseminated intravascular coagulation	3
	Congenital coagulation disorders	2
Week 15	Immune thrombocytopenia.	3
	Test "Bleeding disorders"	2

LITERATURE:

1. Hoffbrand's Essential Hematology. A.Victor Hoffbrandt. Paul A.H. Moss. Seventh Edition.
2. Oxford Hadbook of Clinical Hematology - 4-th edition. Drew Provan, Trevor Baglin, Inderjeet Dokal and Johannes de Vos

CONSPECT FOR SEMESTRIAL EXAM IN HEMATOLOGY

No	THEME
1	Anemia - classification. Iron deficiency anemia
2	Megaloblastic anemia - classification. Pernicious anemia
3	Congenital haemolytic anemias . Microspherocytosis and Enzymopathies
4	Congenital haemolytic anemias – sickle cell disease and thalassemia
5	Autoimmune haemolytic anemias
6	Aplastic anemia
7	Acute myeloid leukemia
8	MPN - classification. Chronic myelogenous leukemia
9	MPN. Polycythemia Vera
10	MPN. Essential Thrombocythemia and Myelofibrosis
11	Acute lymphoblastic leukemia
12	Chronic lymphocytic leukemia
13	Hodgkin's Lymphoma
14	Non-Hodgkin's Lymphomas. Diffuse Large B-cell Lymphoma
15	Multiple Myeloma
16	Differential diagnosis of enlarged lymph nodes and splenomegaly
17	Classification of bleeding disorders. DIC - Syndrome
18	Coagulations disorders - classification. Hemophilia A and B
19	Thrombocytopenia - classification. Immune thrombocytopenia

CONSPECTUS FOR STATE EXAM IN INTERNAL MEDICINE
(HEMATOLOGY IS A PART OF INTERNAL MEDICINE – I)

1. Rhythm disturbances.
2. Conduction disturbances.

3. Congestive heart failure. Hemodynamic classification, treatment.
4. Acute heart failure. Cardiac asthma. Pulmonary edema. Cardiogenic shock.
5. Chronic cor pulmonale (Chronic pulmonary heart disease).
6. Infective endocarditis.
7. Acquired mitral valve diseases.
8. Acquired aortic valve diseases.
9. Diseases of the myocardium. Myocarditis. Cardiomyopathies.
10. Ischemic heart disease. Classification, etiology, risk factors, pathogenesis.
11. Stable and unstable angina.
12. Myocardial infarction.
13. Arterial hypertension.
14. Pericarditis.
15. COPD.
16. Bronchial asthma.
17. Pneumonias.
18. Pulmonary abscess and pulmonary gangrene.
19. Pulmonary carcinoma. Early diagnosis.
20. Pulmonary embolism. Pulmonary infarction.
21. Pulmonary tuberculosis.
22. Pleuritis.
23. Iron deficiency anemias. Vitamin B12 and folic acid deficiency anemias.
24. Congenital and acquired hemolytic anemias.
25. Acute leukemias.
26. Chronic myelogenous leukemia.
27. Chronic lymphocytic leukemia.
28. Lymphomas.
29. Multiple myeloma.
30. Polycythemia vera
31. Bleeding disorders. Immune thrombocytopenia.
32. Bleeding disorders . Haemophilia.
33. Rheumatoid arthritis.
34. Bekhterev's disease.
35. Disseminated lupus erythematosus.
36. Systemic vasculitis.
37. Gout.
38. Acute and chronic glomerulonephritis.
39. Nephrotic syndrome.
40. Acute and chronic pyelonephritis.
41. Acute and chronic kidney failure.
42. Ulcer.
43. Stomach cancer.

44. Ulcerative colitis.
45. Chronic hepatitis.
46. Liver cirrhosis.
47. Cholelithiasis. Cholecystitis.
48. Liver failure.
49. Chronic pancreatitis.
50. Thyrotoxicosis.
51. Myxedema.
52. Acromegaly.
53. Diabetes insipidus.
54. Hypercorticism.
55. Addison's disease.
56. Hypoparathyroidism. Hyperparathyroidism.
57. Diabetes mellitus – etiology, pathogenesis, clinical presentation.
58. Diabetes mellitus – complications and treatment.
59. Pheochromocytoma.
60. Differential diagnosis of coma.

NOTE: In the written exam, a whole topic or a part of a topic is written.